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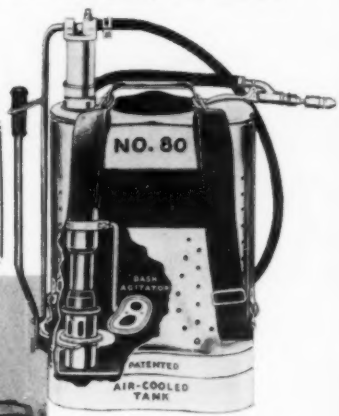

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A Case History of Industrial Forest Management in North Central Florida

Donald D. Stevenson and David D. Schores

IN AN ARTICLE in the JOURNAL, Professor Walter H. Meyer[1] made a very interesting summary of the types and forms of forest management procedures and organization found among southern lumber and pulp and paper companies. In commenting on the relative paucity of information about industrial forest management, Professor Meyer pointed out that foresters in private employ are not prolific writers, with the result that little literature on forest management practices is available.

The purpose of this article is to make a start toward filling this gap in the general knowledge of industrial forest management by presenting a case history of the management of the forest lands of The Buckeye Cellulose Corporation in north central Florida.

The primary goal of the Forestry Department of The Buckeye Cellulose Corporation is to insure an adequate supply of raw material for the pulp mill, now and in the future, during wet as well as dry seasons of the year. In order to reach this goal, pine management policy is to grow the maximum volume of cellulose per acre within the limits of site capacity and reasonable costs. At present, approximately 20 percent of mill requirements for wood comes from company-owned land. This percentage will increase as pine growing stock levels are built up. It is expected, however, that some wood will always be purchased on the open market.

Another goal is to make a profit from the timberlands by the sale of stumpage to the mill, and from sales of pine, hardwood, and cypress sawtimber, as well as miscellaneous products such as crossties. It is hoped to increase income and lower costs sufficiently to generate a favorable cash flow, while building up the value of the forest property.

Buckeye owns or has under long-term lease approximately 800,000 acres of land in north central Florida. This land is divided into two tracts, the Foley Forest of some 616,000 acres which lies within 50 miles of the pulp mill, and the Carrabelle Forest of 181,000 acres, approximately 100 miles to the west. Unlike many large land holdings in the South, this land is well consolidated, with relatively small amounts of outside ownership within the gross land area covered.

Of the 616,000 acres in the Foley Forest, 353,000 acres or 57 percent of the land is classed as pine or potential pine land, 145,000 acres or 24 percent is in hardwood types, 82,000 acres or 13 percent is in cypress types, and 36,000 acres or six percent is composed of miscellaneous types, such as marsh, water, roads, or other nonproductive land. Although some of this hardwood and cypress acreage is in large blocks, a large percentage of these types is intermixed with the pine land in the form of landlocked ponds and streams. This feature complicates the management of these types along with that of pine.

As in most other parts of the South, the condition of Buckeye pine land reflects its past fire and cutting history. Numerous wildfires and poor cutting practices have left the pine land covered with a patchwork of stands varying greatly in age class and degree of stocking. Large acreages of scrub oak "sand hills" contain only scattered remnants of the original pine stands, while in some of the wetter areas overstocked stands of young pulpwood, generally with a residual overstory, are common. In between these extremes are stands of almost every age and density classification.

Initial Phases of Forest

For administrative purposes, the 616,000 acres of land in the Foley Forest were divided, when the land was acquired in 1951, into two districts, supervised by district foresters. Each district was subdivided in turn into three areas of approximately 100,000 acres in size. An area ranger, later called

THE AUTHORS are with The Buckeye Cellulose Corp., Foley, Fla.

[1]Meyer, W. H. Impressions of industrial forestry in southeastern United States. Jour. Forestry 58: 179-187. 1960.

area forester, managed each area. Later developments made more intensive subdivision of these lands necessary. In 1956, 181,000 acres were acquired near Carrabelle, Florida. Management of this property has been less intensive so that the plans and policies described do not apply there.

Following an initial inventory from which volumes were obtained by sections and townships for pine and by over-all estimates only for hardwoods and cypress, annual cutting budgets were developed with allowable cuts set well below the estimated annual growth. The main pine management objective was to build up the growing stock through thinnings and improvement cuts. It was estimated that average pine volume had to be increased from 6 cords to 20 cords per acre to insure 80 percent of full stocking.

Volume control management of this type actually amounted to uneven-aged stand management with even-aged silviculture. The plan was to clearcut with seed trees or clearcut and plant individual mature stands and to thin and to make improvement cuts in immature stands, all within the 100,000-acre administrative area. Since this amounted to all-aged management, the only possible control was by volume. At the same time, numerous plantations were being established within the several administrative units on cutover longleaf land where no natural regeneration of slash pine, the favored species, could be expected. These plantations varied from 1 to 600 acres in size and tended to be scattered through the natural stands as cut over or thinly stocked areas were reforested. In general, stands of pulpwood size below 30 percent stocking were planted after clearcutting.

The planting program was organized locally under each area ranger. His fire crew did the planting and the controlled burning of the planting site. No other site preparation was undertaken, although investigation of various methods of partial land preparation was begun with the initiation of a forestry research program. The area ranger and his fire crew could handle a small planting schedule. When this began to mushroom into a five or six million tree program, however, the local organization became overloaded with work. Since the planting and fire seasons coincide in north Florida, November through March, the area ranger and his men had a double job that did not make for efficiency of operation.

The administrative problem of the planting program was resolved by placing the entire operation under a reforestation superintendent. A greater problem was the low survival in plantations established during 1954 and 1955 on sites prepared only by burning. Survival percentages of 60 or less raised questions regarding the why and wherefore of putting slash pine seedlings into the burned-back rough of palmetto and wire grass to have half of them die before the end of the first growing season.

The findings of the staff of the Marianna, Florida, Research Center of the Southern Forest Experiment Station, that complete site preparation to remove competing vegetation increased survival and growth of planted pines, met this major planting problem and strongly influenced the decision to change the forest management system from volume control to area control.

Change to Area Control

Under a plan of area control, first developed for part of the forest and finally decided upon for the entire 616,000 acres, each administrative area of 100,000 acres was subdivided into management blocks (compartments) averaging about 1,500 acres each. On each block where the stands were merchantable but, due to understocking or overmaturity, were growing less than a cord and a half per acre per year, the expected average yield from plantations, all pine was to be cut. The site would then be prepared and planted. Stands not clearcut were to be left until the second rotation. A 30-year rotation was set, requiring the complete treatment of all pine lands on an average of two blocks per area per year over the rotation. Management plans were drawn up in a policy statement outlining both general procedures and specific marking rules for leaving seed trees on wet, inoperable sites and for intermediate cuts in immature stands.

Area control management will thus ultimately result in an even distribution of pine age classes on each administrative area. Stand management is replaced by block management of a single age class. Only the immature stands, or those still "paying their way," will keep their identity until the second rotation.

The decision to go over to area control management was precipitated by the advisability of complete site preparation for all plantations, but other considerations also played a major part in this change of program. Area control has these additional advantages to the company over volume control:

1. Regulation of the cut is more easily achieved. With an even distribution of age classes by areas, cutting decisions are simplified as contrasted with the patchwork operations involved under volume control.

2. Inventories and record keeping are less complicated since individual stand descriptions within blocks are minimized.

3. Management by blocks makes for the greatest efficiency in site preparation since relatively large units can be prepared with heavy mechanized equipment at a lower cost.

4. Timber marking costs, a sizable expense in making intermediate and improvement cuts in natural stands, are reduced. As natural stands are replaced by plantations, intermediate cuttings will probably be mechanical, by alternate or every third row. They may be eliminated completely by wider spacings.

5. Long log harvesting is more practicable under clearcutting. Increased mechanization results in more efficiency, returning more profit to the producer, and higher stumpage returns to the company.

6. Further reduction of logging costs is expected in the future be-

cause of ease of operation on brush-free land and in plantations with regularly spaced trees.

7. Controlled burning is simplified on cleared sites.

8. A forest genetics program, pointed toward the raising of nursery stock from genetically superior seed, requires a silviculture based on artificial rather than natural regeneration. Once embarked on the job of increasing productivity by genetic means, artificial reforestation by clearcutting and planting on a short rotation appears to be the only feasible system of pine management.

While Buckeye has gone into pine management deep enough to firm up long-term plans and forecasts, the how and why of hardwoods and cypress management present the company with different problems. As previously indicated, hardwoods and cypress occupy about 37 percent of the company acreage. Systematic management of these species, however, has been postponed for several reasons. For one, the Buckeye mill has required a very small volume of hardwoods, and cannot use cypress in its process. Again, most of the hardwood stands have been high-graded for veneer stock over a long period of time, with a consequent deterioration of quality, leaving hard-to-sell, low-grade material. Finally, hardwood stands, with their diversity of species, have special silvicultural problems which take time and experience to resolve.

The cypress is even more of a problem. There are very limited markets for pond cypress, the major component of the cypress stands. Pond cypress, where found in land-locked ponds, is small, averaging less than ten inches in diameter, is slow growing, and has a high percentage of defect, the result of periodic wild fires during especially dry seasons. Limited volumes of small sawtimber are sold to local mills for paneling and crating material. If better markets develop, more attention will be given to cypress management.

As a start toward hardwoods management, CFI plots were established in all the hardwood types in 1950, and an over-all inventory obtained by species, size class, and log grade. Since the bulk of the stands was found to require improvement cuts and cull tree removal, a cross tie operation was started in oak types, to be followed by chemical control of brush and deadening of culls. Additional stands in the swamp hardwood types, which include the gums, ash, bay, maple, and elm, are being marked for veneer and sawtimber sales with plans for cull and brush control afterwards. The silviculture practiced will not conform to any rigid pattern since the main objective will be to improve growing stock and favor the most desirable species. The extent of these improvement cuts in hardwoods will depend on markets for relatively low grade material.

Progress Toward Age-Class Distribution on a Management Area

A specific management area of the Foley Forest will now be described as an example of forest management directed toward achieving uniform age class distribution. The Salem Area contains 97,062 acres of company-owned land and 1,280 acres of long-term leased land. For all practical purposes this leased land is treated exactly as company-owned land, with the entire 1,280 acre tract making up one management block for accounting purposes. Management of the Salem Area is under the direct supervision of a technically trained area forester. Although he has general responsibility for all activities in his area, he has direct responsibility for preparing cutting budgets, marking timber, supervising timber harvesting operations, laying out roads, controlled burning, and public relations. Activities such as fire control, site preparation, tree planting, road building, and research work are the responsibility of other supervisory and technical personnel, although coordination of these activities is of necessity an important phase of the area forester's work.

The Salem Area is divided into 64 management blocks, averaging 1,537 acres per block and ranging

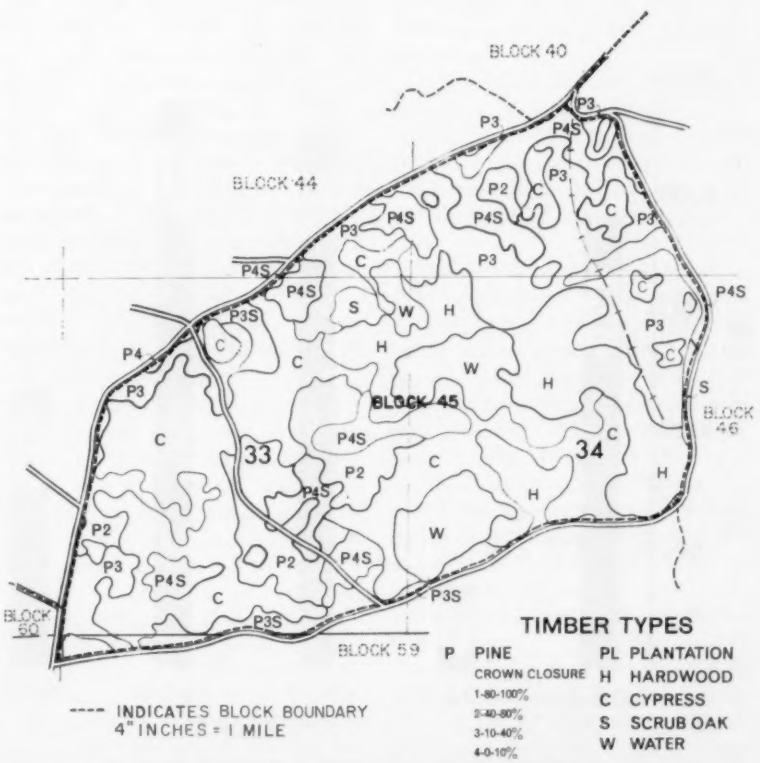

FIG. 1.—Type map of a management block in the Salem Area.

from 209 acres to 3,740 acres in size. Management block boundaries follow roads, streams, swamp lines, or any other natural or man-made feature that is readily identified on both maps and on the ground (Fig. 1). Although an attempt was originally made to keep management blocks uniform in size and relatively homogeneous in timber structure, this was not altogether possible due to an insufficiency of boundaries and the variability of timber stands even within a relatively small area. Management blocks are further subdivided into cutting blocks for the purpose of marking and harvesting control, although these cutting blocks are strictly temporary in nature and disappear when all cutting is completed in the management block.

A typical management block of 1,537 acres in the Salem Area contains 891 acres of pine land, 345 acres of cypress and mixed cypress types, 271 acres of hardwood types, and 30 acres of roads, water, or other permanently nonproductive land. The pine land is composed of two basic types, flatwoods, averaging 703 acres per block, and scrub oak, averaging 188 acres. The flatwoods acreage is characterized by a pine—palmetto—wire grass complex requiring site preparation by complete disking prior to tree planting. The scrub oak acreage, referred to commonly as "sand hill" land, is characterized by a longleaf pine—turkey oak—wire grass complex. Site preparation on this type is accomplished by dragging a span of anchor chain between two Caterpillar tractors to level the oaks, windrowing them, and disking the site prior to planting. Approximately 10 to 15 percent of the flatwoods pine land is classed as nonplantable due to wet conditions, and seed trees are relied upon in these areas for regeneration.

The general sequence followed when treating a management block is (1) lay out and build logging roads, (2) mark the timber, (3) cut both pine sawlogs and pulpwood, (4) cut any cypress or hardwood sawlogs to be removed from the blocks, (5) remove "lightered" stumps, (6) prepare the site, and (7) plant. This cycle of operation takes from one to four years to complete, depending upon economic and weather conditions which will be discussed later.

To date 6,160 acres of pine land have been prepared and planted under the management block system in the Salem Area in four years. Figure 2 compares actual pine acreage planted as contrasted with the ideal acreage required to obtain an even distribution of age classes over the rotation. Actual and ideal acreage figures do not compare as well as should be expected, with a deficit of nearly 1,500 acres for the four-year period and wide fluctuations from year to year. Although caused in part by weather conditions, this situation resulted mainly from insufficient preplanning of site preparation work. Steps are now being taken to minimize those fluctuations in the future.

During 1959, approximately 25 percent of the pine volume produced on company land came from the Salem Area. This compares to the ideal of 21 percent based upon the proportion of standing volume company-wide to the standing volume in the Salem Area. Up to the present time hardwood and cypress volumes removed have been insignificant under the block management system in the Salem Area, although recently a cypress sawlog operation has been started in a management block awaiting site preparation and planting.

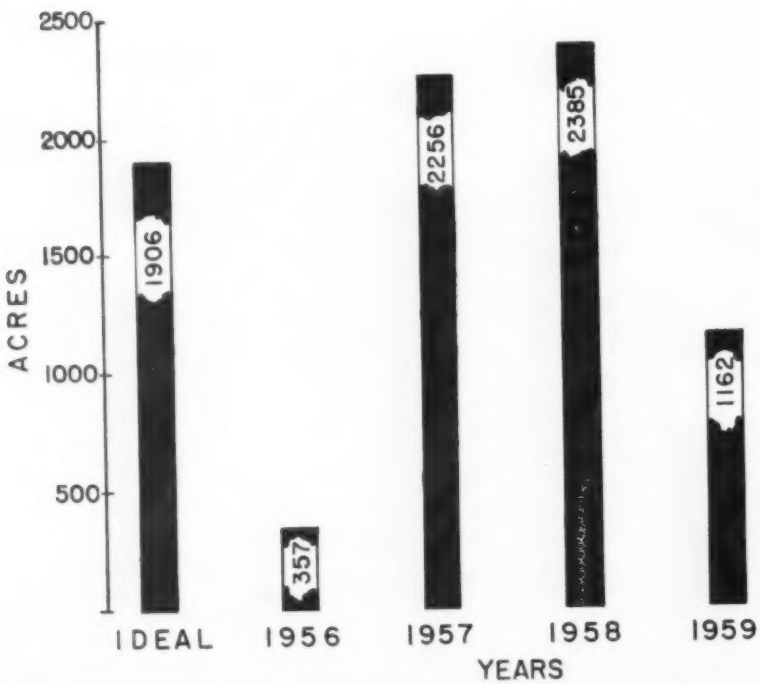

FIG. 2.—Graph showing pine acreage cut, prepared, and planted compared with the ideal acreage required to obtain an even distribution of age classes—Salem Area.

Discussion

As was stated previously, management block boundaries follow natural or man-made features that are readily identified on both maps and on the ground. Initially these boundaries were placed on a map, with the understanding that some changes would be made. Generally, these original boundaries have proven satisfactory, although with the addition of new roads, a closer look at stand conditions and structure, and logical logging considerations, some changes have been made. Any changes in these boundaries initiated changes in the office records for the blocks concerned. It is anticipated that fewer block changes will be made in the future.

Although one of the long range forestry goals is an even distribu-

tion of age classes by management area, it is not possible to accomplish this completely during the first rotation. One factor is the necessity of shifting harvesting and site preparation work due to fluctuations in the weather. North central Florida is characterized by rapid changes in water levels due to heavy rains, poor natural drainage, and sandy soil. Management blocks change from operable to inoperable within a matter of days. In addition, some management areas contain a larger proportion of "wet" blocks than others. In order to take full advantage of extended dry periods, harvesting and site preparation crews are shifted to these normally "wet" blocks, while during extended wet periods the reverse is true. Aside from making an even distribution of age classes by area difficult, this condition also creates the need to have a larger amount of acreage available for site preparation than might otherwise be necessary. In several cases, management blocks in "dry" areas have remained idle two to three years in order to take advantage of extended dry periods.

Another factor which makes the obtaining of an even distribution of age classes by area difficult is the present uneven distribution over the entire Foley Forest. It would appear unwise to cut blocks with young, vigorous trees in one area and ignore blocks containing overmature trees in another area just for the sake of an exact, even distribution of age classes by each area. On the other hand it would be impractical to concentrate most cutting in one area containing a high proportion of mature timber. In practice, a compromise between these two extremes is reached. In any case, it should be recognized that proper scheduling of site preparation and planting is the important factor in obtaining this goal, not necessarily the order in which blocks are harvested.

Another relatively minor factor relating to this problem is the apparent necessity of retaining some stands in clearcut blocks. Small plantations of various ages are scattered throughout the property, along with fully stocked stands of reproduction and saplings. These stands are left to grow for 30 years and will be harvested at the end of the plantation rotation.

Variations in mill requirements from company lands also influence the orderly development of an even distribution of age classes by areas. Since additional demands usually come during extended wet periods, when outside wood supply is reduced, areas containing relatively dry blocks must furnish this increased cut, thereby making more acreage available for site preparation in one area than in another. The choice must then be made between allowing this additional acreage to lie idle or disregarding the ideal in age class distribution. Again a compromise between the two extremes is generally reached.

Because of these factors, it is not expected that an ideal distribution of age classes by areas will be attained during the first rotation. It is expected that many of these complicating factors will be resolved at the end of the first rotation and that an even distribution of age classes by areas will be achieved for the most part by the end of the second 30-year rotation.

A 30-year rotation for planted slash pine on prepared sites was decided upon after comparing the yields of some existing plantations on company lands with yield tables for planted slash pine in Florida.[2] Site quality, the height of the dominant trees at 25 years, varied with drainage classes as developed for all sites. It has been found that such drainage classes are closely related to soil types and are recognized by both site indicators and soil profile characters.

For example, Drainage Class I represents an extremely well-drained soil, characterized by deep sands of the Lakeland soil series and covered with a turkey oak—longleaf pine—wire grass complex. Plantations on this soil have a site quality of 50 with an expected yield of less than 30 cords at 30 years. Such a yield is at the low end of the scale, in contrast to yields of more than 50 cords at 30 years on well to moderately well-drained soils, Drainage Class II. Some sawtimber will be grown with this rotation on the more productive sites. Sales of sawtimber are part of company policy.

Although yield estimates from Barnes' tables have been prepared for various sites, they are tentative for several reasons:

1. There are only a few local plantations from which to obtain data.

2. Some of these are not on prepared sites. Barnes gives a seven-foot height advantage at 25 years to slash pine plantations on cleared sites (old fields) over those "in the rough." More precise comparisons are necessary before reliable local yield tables can be constructed.

3. Yields from plantations on Buckeye prepared land may not necessarily be the same as from old field plantations, even on comparable sites. The degree of clearing is different, and the effects of past agricultural practices introduce unknown factors into such comparisons. Attempts to reduce old field plantation yields by various percentages, based on degree of ground cover remaining, are pure guesswork.

As plantations are established and reach merchantable size classes, it will be possible to develop yield tables by sites for all the pine lands. Yields can then be estimated for the purpose of systematic regulation.

The establishment of large acreages of slash pine plantations on prepared sites introduces problems never encountered before. Single species plantations in themselves aggravate the dangers from insects and diseases. Slash pine adaptation to natural longleaf sites is in itself an unanswered question. In the planning stage is a shift from single species management to the use of both longleaf and slash on some sites. Nursery production of longleaf seedlings is already under way.

Another unsolved problem is degree of stocking for plantations on cleared sites. Intensive silviculture, with thinnings at close intervals, will hardly be practical on

[2] Barnes, R. L. Growth and yield of slash pine plantations in Florida. Research Report No. 3. University of Florida, Gainesville. 1955.

hundreds of thousands of acres. The thinning problem exists also to a lesser degree in handling young, overstocked natural pine stands which will be left to the second rotation. A conventional thinning operation for trees of ordinary pulpwood size, with a field debarker and chipper installation for small-sized material is being tried on several blocks. This combination operation looks promising, although such a thinning in 20- to 25-year-old stands cannot result in much growth acceleration at that age.

Finally, in considering the overall problems involved in plantation management, their vulnerability to fire poses an ever-present threat. Reduction of rough by site preparation will make controlled burning easier, however, when the stands are over 10 years old and have closed in. Such a program of periodic control burning is anticipated in these plantations.

This review of forest management on a particular property in the South shows the evolution through which one company has gone in arriving at a relatively intensive form of management. The problems encountered were not unique and are shared with other large forestry enterprises in Florida and south Georgia. The system of management now in operation has the advantages of simplicity and special adaptation to large-scale mechanization of harvesting and reforestation.

The Valuation of Immature Timber Stands and the Processing of the Data by Electronic Machines

Everett R. Hunt and John F. Bell

THIS paper is concerned with the development of a practical method of appraising immature timber lands in the Douglas-fir region, a method giving consideration to all of the important variables involved, yet not overly complex and unwieldy.

An analysis of the presently accepted methods of appraising immature timber in the Douglas-fir region was made by the Oregon State Forestry Department. The results of this show that, while there have been several generally accepted methods developed and applied, there is still a lack of a uniform, dependable, and mechanical method of computing appraisal data. The greatest obstacle to establishing such a procedure is encountered in the complex problem of reducing the variables to a few basic factors. The finest appraisal procedure will be of only little value to the appraiser if it is so involved that he either does not understand its function or does not wish to use it because of its complexity. With this in mind, the Department decided to attempt to develop a system that would require little more than the customary work for the field men and would rely on electronic machines to assemble and sort the data, carry out the calculations in the complex formulas, and then present the answers in report form.

Still another problem that must be considered in an appraisal procedure of this type is that of defensibility, since it is dealing with a commodity which, at the time of appraisal, has only a speculative value. Fair market value is the only legal basis recognized by the courts for determining the present worth of an immature stand of timber. However, it should be understood and recognized by forest appraisers, and the courts as well, that to base the value of an immature stand of timber on prices paid for similar stands of timber, even in the same locality, often is unrealistic. With timber there are numerous values involved which make each appraisal unique and separate from other appraisals. Such contingent factors might include access, availability of markets, topography, blocking-in of ownership, fire susceptibility, and other more intrinsic values.

The approach that the Department decided to adopt is that of expansion and elaboration of a method of appraisal presented by the West Coast Forestry Procedures Committee.[1] The basic approach remains the same but has been expanded so that the cumbersome computations may be carried out entirely by electronic machines.

Because of the ever-increasing recognition of the value of premerchantable timber, this procedure should be useful for many purposes such as the appraisal for exchanges, acquisitions, and damages. From a purely economic approach, the appraisal would be useful in determining the value of premerchantable timber as an investment and the financial returns that may be expected, the advisability of holding immature timber, and financial rotation for any stand of timber.

In order to be useful, a method of appraisal must be flexible, so that as management practices develop and improve, the procedure will readily adapt itself to any change. With this in mind, this method was kept as flexible as possible, and the programming of the material for the electronic machines was planned so that any change can immediately be incor-

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[1] Western Forestry and Conservation Association. West Coast Forestry Procedures Committee. Report No. XI. A procedure for appraisal of damage in pre-merchantable stands. November 1954.

porated without an entire reprogramming. The valuation procedure resolved itself into the determination of the following factors: The future net yield value, the bare land value, the interest rate earned, and the present worth of the immature timber.

The Field Procedure

The appraisal method may be used in conjunction with any standard field cruising procedure. For reproduction, stocking surveys are to be made; for immature timber, basal area will be determined; for mature timber, a standard cruise and appraisal will be made as if the timber were to be sold. However, this system of appraisal will deviate from the standard procedures in that the following values will be determined in the field: bare-land value, planting costs, annual expenses, and logging costs. The sampling procedure has been designed to be used with wedge-prism point sampling, but it may be adapted for use with strip or fixed-radius plot cruises.

Upon completion of the field work, the plot cards are sorted and indexed by type islands within the various units; these may be sections, forties, or some other desired unit. The data on the plot cards are then transferred directly to the machine cards. The State Forestry Department has been using IBM cards and has programmed the appraisal material into the IBM "650" machine. The computer programming involves the use of two formulas, one for the determination of the rate of interest earned by the stand of timber and the other to determine the present worth of the stand.

Determination of the rate of interest.—The determination of the rate of interest earned by the stand was accomplished by equating the following formula electronically. (The rate of interest (p) is an unknown in each side of the equation.)

$$(1+p)^r = \frac{Y + S + \frac{e}{p}}{C + S + \frac{e}{p}}$$

where Y—final net yield value
S—land value
C—cost of establishment
e—annual expenses
r—rotation age
p—interest rate expressed as a decimal

Determination of final net yield value.—The final net yield value (Y) is the product of the estimated normal yield of the stand at rotation age, times the density of stocking, times the stumpage price. The allowance for the increase toward normality of the stand was incorporated into the computer program. This involved the consideration of age and density of the stand at the time of sampling for all possible combinations of ages and densities. Estimations of breakage and defect, as found in a West Coast Forestry Committee's report,[2] were also programmed.

For the prediction of volumes of stands at rotation age, normal yield tables were used. For instance, for Douglas-fir, the normal yield tables as compiled for use in the Pacific Northwest were used.[3] The prediction of grade for stands under 11.0 inches d.b.h. was also made with the help of these tables. By assuming general grade characteristics for Douglas-fir, the percent of No. 2 and No. 3 sawmill logs was estimated when diameter was considered the most critical and limiting factor.

The stumpage value is determined by the computer program

[2]Western Forestry and Conservation Association. West Coast Forestry Procedures Committee. Report No. V. Determination of the allowable cut for forests in the Douglas-fir region. Table 2. Allowance for breakage and defect for second-growth Douglas-fir stands. 1950.

[3]McArdle, Meyer, and Bruce. The yield of Douglas-fir in the Pacific Northwest. U. S. Department of Agriculture. Technical Bul. No. 201. October 1930. (Revised October 1949.)

COMPUTER REPORT NO. 1

LAND AND IMMATURE TIMBER APPRAISAL SUMMARY

Fields	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		25	26	27	28	29
Columns*	1-2	3	4-5	6-7	8	9-10	11-12	13-14	15-16	17-19	20-22	23-24	25	26-27	28-29	30-33	34	35-36	37-38	39-41	42-43	44-45	46-47	48-50	51-52	54-56	57-61	62-66	67-71	72-78
	EXCH#	YEAR	UNIT#	COUNTY	OWNER	TYPIS[1]	FORTY#	SEC	TWP	RGE	ACRES	SPECIE	SIZECL	AGE	SITE	BAF[2]	HPT F[3]	LAND V[4]	PLANT[5]	NEXP[6]	LOGG[7]	$2[8]	$3[9]	STOCK[10]	TOCC	INTR[11]	VAL[12]	LAND[13]	BRVAL[14]	TOTVAL[15]

1. Type Island Number
2. Basal Area Factor
3. Full or half point
4. Land Value
5. Planting costs
6. Annual expenses
7. Logging costs
8. Value No. 2 sawmill logs
9. Value No. 3 sawmill logs
10. Stocking Class
11. Interest Rate
12. Final Yield Value
13. Land Value
14. Timber Value
15. Total Value

* Refers to columns in the IBM card

FIG. 1.—Land and immature timber appraisal summary.

from the above information and the final net yield value can then be computed.

Determination of land value.—The current market value of bare land is used as the land value (S).

The following formula may be used when limited market transactions do not establish a reliable bare land value. (The final net yield value must be determined for a normally stocked stand at rotation age.)

$$SEV = \frac{Y - C}{(1+p)^r - 1} - \left(\frac{e}{p} + C\right)$$

The objection to the use of this formula is that the percent of interest must be assumed. This, at first glance, would appear to be a purely arbitrary assumption, but upon closer analysis it becomes evident that the rate of interest earned by the land closely parallels the percent of interest earned by a fully stocked stand of timber produced on that land. The values of the land appear reasonable when the same rate of interest is used as the percent of interest earned by a fully stocked stand on the same land. If desired, the rate that could be earned on alternate investments of comparable risk may be used. Adjustments must be made for valuation of bare land that contains brush or unmerchantable timber which will require spraying or scarifying to prepare it for reforestation.

Cost of establishment of stand.—The cost of establishing a stand (C) will vary with each individual appraisal and will be the responsibility of the field man to estimate. There will be average cost figures available that can be used as guides for most areas, and these will aid the forester in determining the appropriate cost.

Determination of annual expenses.—As in any other business, the annual expenses (e) involved in forest administration, protection, and development will vary with the type of enterprise and the general economic conditions at the time of appraisal. To arrive at an exact figure for capitalization of annual expenses would require a thorough cost analysis of each particular business.

Taxes will play a very important role in determining the annual expenses for private industry, while for public agencies they usually will not have to be considered. If yield taxes are being used, the yield tax may be deducted directly from the final net yield value without requiring the adding of taxes to the annual expenses. If taxes are based on the general property tax (ad valorem tax), then taxes will have to be averaged for all the years in the rotation and added to the annual expenses. An average yearly tax is difficult to determine due to the periodic changes in assessed valuations.

Determination of rotation age.—The rotation age (r) will have to be determined prior to the time of appraisal. The period may be based

O.S.B.F.
STOCKING SURVEY-EXCHANGES

EXCH. NO. (1-2) _____ UNIT NO. (4-5) _____ CO. (6-7) _____ OWNER (8) _____
TYPE IS. (9-10) _____ FORTY NO. (11-12) _____ SEC. (13-14) _____ TWP. (15-16) _____
RGE. (17-19) _____ AC. (20-22) _____ SP. (23-24) _____ SIZE CL. (25) _____
AGE (26-27) _____ SITE (28-29) _____ LAND V. (35-36) _____ PLANT $ (37-38) _____
ANN. EXP. (39-41) _____ LOGG. $ (42-43) _____ $2 S (44-45) _____ $3 S (46-47) _____

PHOTO NO. _____ STRIP NO. _____ TYPE _____ DATE _____ CREW CHIEF _____

PLOT NO. (50-51)	QUAD STOCK (52)	SPECIES						COVER		PLOT NO. (50-51)	QUAD STOCK (52)	SPECIES						COVER	
		D	H	C	S			LT.	H			D	H	C	S			LT.	H

REMARKS _____

Fig. 2.—Stocking card for reproduction.

O.S.B.F.
WEDGE PLOT CARD—EXCHANGES

EXCH. NO. (1-2) _____ UNIT NO. (4-5) _____ CO. (6-7) _____ OWNER (8) _____
TYPE IS. (9-10) _____ FORTY NO. (11-12) _____ SEC. (13-14) _____ TWP. (15-16) _____
RGE. (17-19) _____ AC. (20-22) _____ SP. (23-24) _____ SIZE CL. (25) _____
AGE (26-27) _____ SITE (28-29) _____ BAF (30-33) _____ F OR H PT. (34) _____
LAND V. (35-36) _____ PLANT $ (37-38) _____ ANN. EXP. (39-41) _____ LOGG. $ (42-43) _____
$2 S (44-45) _____ $3 S (46-47) _____

SI. SP. _____ AGE _____ HT. _____ SP. _____ AGE _____ HT. _____ SP. _____ AGE _____ HT. _____

PHOTO NO. _____ STRIP NO. _____ DATE _____ TYPE _____ CREW CHIEF _____

TREE COUNT						TREE COUNT					
50-51	52-53	54-55	56-57	58-59	60-61	50-51	52-53	54-55	56-57	58-59	60-61
PLOT	D	H				PLOT	D	H			

on a financial rotation, mean annual increment, or any arbitrary period; this period may vary from time to time within the same organization. Since the programming for the computer can be made very flexible, this will create no problem and changes may be made whenever rotation ages are changed.

By a slight modification of the program for determining rate earned, the rotation yielding the highest rate may be selected.

Determination of present worth.—The final step in the appraisal procedure will be the determination of present worth. Two approaches may be made for solving for this value—one by compounding the interest for the stand from the time of establishment, and the other by discounting the value from the predicted future net yield value to the time of appraisal.

The formulas are as follows:

Discount formula

$$V_m = \frac{Y + S + E}{(1+p)^{r-m}} - (S + E)$$

Where V_m=present value of stand (timber, exclusive of land)
m=present age of stand
E=capitalization of annual expenses=$\frac{e}{p}$

Interest formula

$$V_m = (C+S+E)(1+p)^m - (S+E)$$

When the percent of interest earned by the stand of timber has been calculated, the use of either one of these formulas will result in the same value, and either formula may be programmed.

Computer Calculations

Data to be processed by computer program.—The Computer Report No. 1 (Fig. 1) shows the fields and columns as they have been constructed. For convenience in analyzing the results given in this report both inputs and outputs are shown. (Columns 1 through 47 are inputs and columns 48 through 78 are outputs). Due to the limited space allowed, abbreviations and symbols are necessary. All of the information which has been transferred to the IBM cards appears on the plot cards (Figs. 2 and 3). The plot card for immature timber has been designed for use with wedge-prism cruises. Field 16 on the Report No. 1 is for the recording of the basal-area factor of the wedge prism, and Field 17 for recording whether full (F) or half (H) points (semicircular plots) were taken. Logging costs, Field 21, are to be estimated by the field man for a type island, several type islands, or for the entire unit. This is best accomplished by personnel most familiar with the area.

Fields 22 and 23 are used to record the value of No. 2 and No. 3 sawmill logs.

Results to be obtained from the computer program (Fig. 3).—From the data received in Fields 1 through 23, the computer program is able to provide the following information:

1. basal area per acre
2. stocking percent and stocking class
3. interest rate earned by the stand
4. final net yield value
5. total land value
6. timber value
7. total value of bare land and timber

Summation

From the information presented above, a basic appraisal may be made and certain values determined. However, when using this appraisal method, as in any appraisal method, there will be adjustments and refinements to be made. Each appraisal will naturally be involved with values and costs other than those which can be calculated, and no two appraisers will be expected to arrive at exactly the same answer for any given appraisal. This procedure will merely indicate a base value from which an equitable and satisfactory agreement may be reached after all of the factors have been weighed and considered. Because of the very nature of the fluctuation of timber and land value, it is necessary to have a procedure flexible enough that it may be changed at any time.

The objectives of this appraisal procedure are to simplify and organize existing procedures and to program as much of the material as possible for electronic calculating machines. There are, however, improvements and refinements which only future studies will be able to supply. These refinements will have to be made in order that this procedure will meet the needs of all of those who are involved in the appraisal of immature timber. Since the framework of this procedure has been kept flexible these refinements may be incorporated at any time.

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"Trees and Shrubs of Mexico" Reissued

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Silvical Considerations in the Selection of Plus Phenotypes

Claud L. Brown
and Ray E. Goddard

THE SELECTION of outstanding trees in natural stands is one of several approaches geneticists are using toward the initial improvement of forest trees. Although the criteria used in making individual tree selections may vary considerably among persons engaged in genetics research, all active tree improvement programs are currently engaged in the selection, breeding, and testing of plus phenotypes.

The final selection of a given tree from among scores of possible candidates located within a specific geographic area usually constitutes a screening job of large proportion. In addition to seeking trees with excellent bole qualities and desirable crown characteristics, most agencies, public and private, are placing considerable emphasis on selections that possess exceptional vigor as reflected by past performance expressed in the form of present gross volume. For this reason, it is necessary to use some system of selection which reduces subjectivity to a minimum. One of the primary purposes of a grading system is to eliminate phenotypes exhibiting superiority which can be largely attributed to early or recent environmental advantages. Unless a system accomplishes this, it is of little value.

The objectives of this paper are (1) to evaluate the principles commonly used in grading and selecting plus phenotypes within the major species of southern pine, and (2) to describe a more objective system of grading which gives a better indication of a tree's growth potentialities in the environment under which it exists.

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Principles of Selection

Numerous accounts in the literature discuss inherent variation among individual trees of a species and the importance of this variation as a basis for individual tree selection (cf. Dorman (*2*) for an excellent bibliography). Several guides for individual tree selection have also been prepared by various authors concomitant with the recent upsurge in tree improvement activities (*2, 4, 6*). Although as pointed out by Rudolf (*4*), little is presently known about the degree of heritability of many desirable traits, these guides are of value to foresters and others in making initial individual tree selections.

Once a tree has been tentatively selected as a plus tree candidate, most workers engaged in tree improvement research in the South subject it to a rather rigorous series of comparisons with the best (usually largest) trees of the same age growing within its immediate vicinity. In actual practice this is accomplished by the use of different grade-point systems. For example, a series of numerical grades is assigned for each property such as height, volume, limb size, crown width, limb angle, pruning ability, bole form, and the like, which numerically scores the relative superiority or inferiority of the trait in question with that of selected comparison trees in the stand. In most systems the decision whether to accept or reject a certain tree depends upon the total score it receives. Although such a system has the advantage of scoring relative degrees of superiority of several morphological characteristics in the field, it does not attempt to evaluate growth or vigor superiority on a biological basis because (1) assigning a numerical grade of various weights to growth characteristics such as volume and height is purely a matter of subjectivity dependent upon the person devising the grading scheme, (2) a direct comparison of stem diameter, total height, or volume between the candidate tree and its check trees gives no consideration whatever to the degre of competition present, and (3) in some cases the selected tree could register an acceptable final score and still be mediocre in many respects depending upon the weighted scale (arbitrary values) assigned to different traits. In view of these basic shortcomings the authors question the necessity or desirability of using a grading system based on sliding numerical values. Rather it seems more feasible to simply adopt a set of minimum requirements which the selected tree must meet with respect to crown, bole, and vigor characteristics.

To derive a more objective measure of growth or vigor superiority, a consideration of several silvical factors is necessary. Basically the search for plus phenotypes centers around the premise that certain trees are inherently more *efficient* than others in the manufacture and utilization of photosynthates. Stated somewhat differently, a plus tree by *a priori* reasoning possesses the potentiality of producing more increment per unit crown size and growing space than competing neighboring trees of the same age. If this premise is not valid, then the search for plus phenotypes for use in developing elite trees becomes futile. The need for more reliable criteria to use in judging a tree's relative growth efficiency then becomes apparent. Several possibilities for deriving such cri-

teria were investigated, and, because it seems pertinent to the problem as a whole, these are discussed in some detail in the following section.

Selection for Growth Efficiency

Although many factors influence the growth of individual trees on a given site, competition with other trees is probably the most important single factor. It is well established that growth rates of individual trees increase with increased growing space up to a maximum beyond which the tree can no longer utilize the space available. Therefore, under any specified degree of competition, the average tree can be expected to grow at a certain rate. It is not implied that all trees in an even-aged natural stand or plantation will grow at the same rate because even under what may be considered uniform stocking there is considerable variation in the degree of competition around the various individual trees, to say nothing of inherent genetic diversity and local edaphic variations. If trees are selected for superior growth rate (or for volume which is the accumulation of past growth), without consideration of the degree of competition to which they have been subjected, it may be found that they are growing no more than should be expected with the growing space available to them.

If competition around candidates for selection is to be considered, some objective measure of that competition must be made. It seems only logical to assume that the size of the crown should be an indication of competition a tree has undergone, and that the basal area of trees in a plot around the tree in question would be another measure of competition. Chapman (*1*) in discussing the effect of thinning southern pines states, "diameter growth was found to be governed largely by the length of the crown." Minor (*3*) studied the possibility of using aerial photographs for volume determination and using data from 2,501 trees in Louisiana and Mississippi found a correlation (r) of .873 between d.b.h. and crown diameter and has proposed that this relationship is a valid basis for yield tables of loblolly pine under management.

To determine which measurements or combinations of measurements would be the most valid basis for determination of expected growth of individual trees, an even-aged (35 years) old field stand of loblolly pine was selected in East Texas. Fifty trees in this stand ranging from 8 to 16 inches d.b.h. were measured. Measurements included d.b.h., total height, crown length, crown radius (average of 4 sides), total basal area of trees 4 inches d.b.h. and larger within a radius of 37.3 feet of the tree (.1 acre), total basal area of trees 8 inches d.b.h. and larger within a radius of 37.3 feet of the tree, and total basal area of dominant and codominant trees within a radius of 18.65 feet of the tree (.025 acre). On the basis of average radial increment taken from two increment cores 90° apart, basal area increase during the past ten years was computed for each of the 50 trees. Basal area increase was correlated with the various crown measurement. Results of the correlation analyses are presented in Table 1.

Although all r values are highly significant, it is clearly evident that a more reliable estimate of the expected growth of a tree can be made if both crown length and width are measured. It is also indicated that the surface area of the crown is the more reliable indicator of growth capabilities. Volumes of cones, cylinders, etc. are determined by the product of the square of the radius of the base, the height, Pi, and some other constant such as $\frac{1}{3}$. Surface areas of such figures are similarly computed except that the radius of the base is not squared. The correlation between the two variables is not changed by multiplying by a constant. Therefore, the correlation between crown radius^2 $\times$ length and basal area increase is the same as the correlation between crown volume and growth, while crown radius $\times$ length and basal area increase give approximately the same correlation as crown surface area and basal area increase.

TABLE 1.—CORRELATION COEFFICIENTS OF BASAL AREA INCREASE WITH CROWN MEASUREMENTS OF 50 LOBLOLLY PINE TREES

Crown measurement	r
Radius^2	.55
Radius^2 $\times$ length	.77
Radius	.70
Radius $\times$ length	.83

While the correlation obtained by Minor (*3*) between d.b.h. and number of trees per acre was not strong, his data did indicate that trees of the same crown diameter grow more slowly as stand density increases. It was thought that a better relationship would be obtained if basal area of trees competing with an individual tree was determined. From the data obtained by the authors, it was very evident that the growth of the smaller trees was little affected by the basal area on the plot surrounding them. These trees mostly fell into the intermediate or barely codominant crown class. Such trees had reached the stage that anything less than extremely drastic thinning would not appreciably influence their growth (*1*).

The intermediate trees were eliminated and the remaining 37 trees were analyzed for correlation between basal area increase and the basal area of trees surrounding them (Table 2).

It is obvious from the above that the .1-acre plot was too large and included trees not strongly competing with the tree in the center of the plot. However, the correlation between growth of the center tree and basal area of the trees on the .025-acre plot was significant although the low r indicates rather wide variation.

A multiple regression was com-

TABLE 2.—CORRELATION COEFFICIENTS OF BASAL AREA INCREASE OF 37 LOBLOLLY PINES WITH TOTAL BASAL AREA OF SURROUNDING PLOT

Basal area measurements	r
Trees 4"+ d.b.h. on .1 acre	−.07
Trees 8"+ d.b.h. on .1 acre	−.01
Codominants and dominants on .025 acre	−.51

puted of basal area increase on crown size and basal area on the surrounding .025-acre plot. This analysis revealed that although the basal area on the plot was correlated with growth of the center tree, when the effects of crown size were removed, the basal area on the plot accounted for a very insignificant portion of the total variance in growth.

On the other hand the crown size measurement, crown radius × crown length, accounted for 69 percent of the variance of basal area increase. The data on crown size and basal area increase are plotted in Figure 1. Trees number 8 and 10 have both grown .16 square feet more in basal area than would be expected from their respective crown sizes. While there may be other factors such as soil variation that would explain that, it is not unreasonable to suspect that at least part of this variation from regression is due to heritable factors. Whether or not this is true must be determined by progeny tests, but the authors believe that this is a more valid approach to selection for vigor than simply on the basis of superior volume. If strains of these trees can be developed which inherently make better growth for a given crown size, yield tables such as those developed by Wiley (*5*) will have to be revised upward because trees of this type would produce a greater volume per acre, although possibly not per tree.

In checking numerous candidates for selection on the basis of growth efficiency, it would not be necessary to sample 50 trees in the stand as reported here. The authors have checked several selection candidates and have used varying numbers of check trees as a basis for the crown size-basal area increase regression. It was found that as few as ten trees usually gave a correlation coefficient of .65 or higher, a significant correlation with that number of trees, and indicative of a fairly close fit to a regression line. Therefore, ten check trees with a range of crown sizes should indicate a reliable trend for a given site and age class. If a selected tree falls above the confidence interval of the calculated regression, the tree could be considered outstanding in growth efficiency.

General Considerations Prior To Individual Tree Selection

The successful application of any selection system is dependent upon the recognition of its limitations. There are several conditions attendant upon the search for and initial selection of individual trees which, because of their importance, now warrant brief consideration.

Stand conditions.—Plus phenotypes surely occur under open-grown conditions and in all-aged stands, but the difficulty of making direct comparisons with other trees of the same age in the immediate vicinity, to say nothing of how the same tree might have reacted under a totally different environment where competition for survival is the rule rather than the exception, obviates selection under such conditions. The selection of plus trees should, therefore, be restricted to even-aged natural stands or plantations because it is under similar conditions that the progeny from selected trees must eventually prove their worth. Even-aged stands that have not received prior silvicultural treatments in the nature of thinnings or partial cutting are preferable to those receiving such treatments. The prior removal of dominant or codominant trees near the candidate tree can give an erroneous measure of growth efficiency based upon present crown size. This is true because the initial increase in diameter growth following release largely results from the immediate increase in soil moisture and nutrient availability before any appreciable increase in crown size. If, however, these conditions are recognized, one can compensate for this increased growth by measuring the rate of growth prior to release and still score the tree on growth efficiency. Nevertheless, undisturbed stands are preferred over ones receiving periodic recent partial cuts. It is all too obvious that stands which have previously been high-graded for quality poles and/or piles are the areas not to visit in the search for plus phenotypes.

Site quality.—No one knows better than the silviculturist that site plays a major role in the phenotypic expression of tree growth. Site not only modifies growth potentialities per se; it also accounts for a considerable portion of the variation in bole form and crown characteristics. That this is true may be observed by comparing the general form and quality of trees

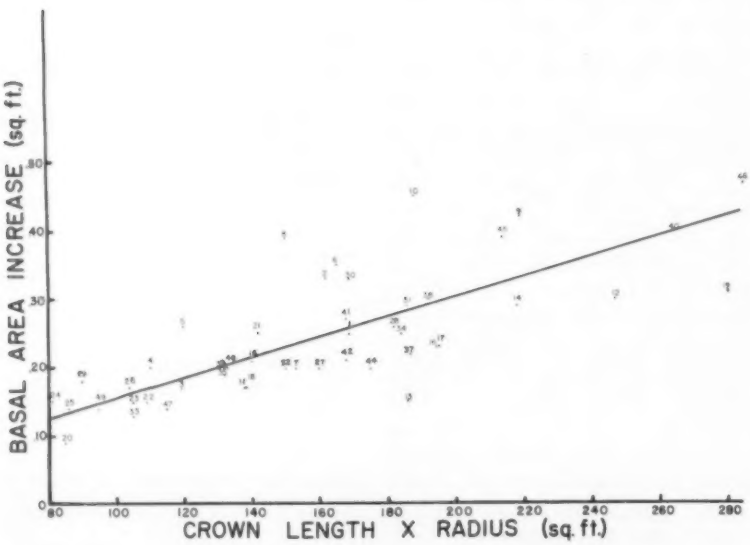

FIG. 1.—Relationship between basal area and crown size measurements of individual trees in a 35-year-old natural loblolly pine stand in East Texas.

from the same seed source planted on a 100-110-foot site with that of trees on a 60-70 foot site. This raises the question of what one should expect quality-wise when the progeny from plus trees selected only from the better sites are planted on much inferior ones and vice versa. It seems logical to infer that good phenotypes from poor sites would react more favorably on better sites than the reverse situation, and for this reason, plus tree selections should not be confined to only the better local sites within any one geographic area.

Where distinct geographic differences exist as a result of edaphic or climatic influences, current evidence indicates that plus trees should be specifically selected for use within such general areas, i.e., plus trees selected in upland areas on heavy soils should be handled separately from those selected in the Coastal Plains so that the progeny from each can be planted in the general area where the original selections were made.

Crown classes. — Seedling establishment which gives rise to nominally even-aged natural stands usually occurs over a period of several years, and as a result many of the initially suppressed or intermediate trees could conceivably possess better than average genotypes without ever having the opportunity to express themselves because of unequal competition from older and larger established seedlings. Such potential genotypes go unrecognized in the process of plus tree selection because one must necessarily infer that the dominant and codominant trees in a given stand did not maintain this position by being inferior competitors. Selection is therefore confined to the dominant and codominant crown classes.

Age classes.—for the most part it seems desirable to search for plus phenotypes of southern pine in stands younger than 50-60 years of age, preferably between 25 and 50 years. In stands younger than 25 years of age, there is likely to be considerable shifting of crown position in the race for establishing dominance; also, it is recognized that some trees are "slow-starters" and vice versa. At the other extreme, i.e., in stands 50 years of age or older, it becomes increasingly more difficult to evaluate past stand conditions and less can be inferred about the earlier environmental influences around a given tree. Furthermore, if an individual tree in any species of southern pine has not expressed the type of growth, crown, or form characteristics desired by the time it is 25-30 years old, the chances are indeed poor that age alone will enhance its *relative* superiority.

Selection of comparison trees.— The recognition of a plus tree on a given site is possible only by association and comparison with other trees. For this reason, the selection of trees with which to compare the tentatively selected plus tree is essential, and the importance of age cannot be overemphasized. Even a 2-3 year difference in initial seedling establishment can account for considerable environmental advantages in early years. Hence the candidate tree can be no older than the selected comparison trees; if, however, it is younger than the latter, its chances of being superior are enhanced.

Most workers in the South, when grading plus tree candidates, search for the best dominant or codominant trees of the same age on the same site in an honest attempt to reject the candidate tree. In other words, a plus selection is not simply compared with average trees, it must be better than the average of the best trees in a given stand. The same general principle is used in the selection system discussed here, but only with respect to a comparison of growth efficiency. For example, ten dominant or codominant trees with a bole diameter as large or larger than the selected tree are chosen for making quantitative measurements of mean annual growth and crown size for use in determining the relative growth efficiency of the selected tree. It was found that ten trees were usually sufficient to give a fairly close fit to a regression line for the stand in question (cf. section on growth efficiency) if these trees possess a range of crown sizes such as is common in any even-aged stand. No emphasis whatever is placed on bole quality of the ten comparison trees because these trees are used primarily for growth and crown measurements and not for comparing such characteristics as bole straightness, spiral grain, limb angle, and limb diameter. These traits need not be compared directly with the comparison trees since the candidate tree must first meet a series of minimum requirements in this respect as discussed in the following section on specific requirements.

Specific Requirements for Individual Tree Selection

In addition to selecting the most promising phenotypes on the basis of growth performance, the worker in tree improvement is concerned with quality characteristics of the bole which enhances the tree's economic value and utility for various wood products. It is only logical that different segments of industry should stress or favor certain aspects of quality; hence workers in different tree improvement programs subjectively place more emphasis on certain phenotypic characteristics than on others. Although some economic traits are admittedly more important than others, it is nevertheless true that any one given trait can be so inferior that it alone would cause rejection of an otherwise acceptable tree. If this were not true, the trait in question would not warrant consideration. Because a considerable amount of subjectivity is involved in any initial selection, the authors believe it is practical simply to delineate the minimum acceptable requirements for each characteristic sought without attaching much significance to the relative degree or level of its superiority above the minimum requirement. It is obvious that the rigidity of any phenotypic expression can be objectively evaluated only with appropriate progeny testing, and in the final analysis, the development of strains of trees which are plus for many desirable traits

can be achieved only by continued selection and breeding among the progeny of successive generations. For this reason it is believed that a tree which meets the minimum requirements set forth below is worthy of being tested genetically in a breeding program directed toward strain building. In establishing the limits of acceptability now used in the Texas program, it seems pertinent to discuss briefly some of the factors associated with these limitations.

Height.—The selected tree must be taller than the average of the comparison trees. The one characteristic which indicates growth superiority at a given age is that of total height. This is evident by the fact that height growth is influenced to a lesser degree by competition for growing space than any other measurable growth property of the individual tree. As with all generalizations, however, there are recognizable limitations. The most important one in this case is that of age. In young stands a height superiority of eight feet may have less significance than one of four feet in an older age class. This is true because differences in rate of height growth are most pronounced among trees of a stand during their grand period of vigorous shoot growth. Near the end of culmination of mean height growth, tree heights tend to become more uniform simply because different trees reach their maximum site limitations at an earlier age, only to have these initial differences erased by slower sustained growers near the upper end of the growth cycle. This, among the less obvious factors associated with natural selection, accounts for the relative uniformity of canopies in older even-aged stands.

D.b.h.—No limitation is placed on stem diameter as such because total volume is not used as a criterion for comparison or selection. It should be pointed out, however, that larger stems have a better chance of qualifying on the basal area increase/crown size ratio than smaller ones because basal area increase accounts indirectly for volume in the form of past and current increment.

Crown size.—Trees with smaller than average crowns (width and length) are sought as plus tree candidates. The reasons have previously been enumerated and warrant no further consideration. Crown length and mean radius measurements are made for use in determining growth efficiency only after the candidate tree qualifies on all other minimum requirements.

Growth efficiency.—The candidate tree must fall above the five percent confidence interval of the calculated basal area increase-crown size regression. By this means the growth of the tree can be compared to the growth that could be expected of a tree with its crown size. No consideration of volume per se is made between the selected tree and its checks (cf. Discussion).

Pruning—The selected tree must be relatively free of dead branch stubs and show evidence of excellent healing around limb scars. The age of the stand and density of stocking modifies the relative comparison of this characteristic accordingly. A quantitative measure of pruning ability is indirectly accounted for in the basal area increase/crown size relationship and needs no further discussion.

Limb diameter.—The average limb diameter of the candidate tree must be no larger than the average limb size of the dominant trees in the immediate vicinity. A visual comparison of limb diameters is made in the upper half of the crowns at the same level. Although limb diameter is a characteristic which definitely influences bole quality, it loses some of its importance if the trees possess excellent pruning ability, e.g., if a candidate tree possesses only average limb diameter and still prunes better than adjacent dominant trees, limb size alone would not be sufficient cause for rejection.

Bole straightness.—1. *Sweep.* A theoretical line drawn from the center of the bole at the base of the crown to the base of the tree must stay within the bole at every point along the way. This is a rather strict requirement when one considers that a tree may be annually subjected to a host of environmental influences such as adjacent trees, ice, and wind, any one of which could induce varying degrees of sweep during some period of its life cycle. Perhaps too much stress is placed on the occurrence of sweep; however, one may reason that the susceptibility to sweep from natural causes is less in some trees than in others and likely not overstate the case. Therefore, to account for these possibilities, a plus tree should possess a straight bole.

2. *Crook.* Repeated short crooks along the bole are readily distinguishable from sweep and are of sufficient economic importance to cause rejection. This characteristic may be induced by either repeated insect attacks, ice damage, or by an inherent tendency to crook. Such excessively crooked forms are not at all uncommon in natural stands of loblolly and shortleaf pine growing on a variety of sites in East Texas.

Bole spiraling. — Visible spiral twist of one-fourth turn or greater along the length of the clear bole is sufficient cause for rejection.

Limb angle.—The average limb angle of the selected tree must not be less than 45 degrees from the vertical. In southern pines there is considerable variation in this trait even among individual limbs on the same tree, hence little significance is attached to limb angle unless it is obvious that the tree possesses the typical and undesirable fastigiate type of branching throughout.

Ramiform branching.—There is some evidence that the ramiform branching habit which frequently occurs in individual trees of southern pine is a characteristic under genetic control. For this reason, a tree which possesses one or more ramiform branches is rejected as a plus tree candidate.

Disease and insects.—The selected tree must be free of past injury from both.

If a tree qualifies on these requirements, it is considered worthy of testing for general combining ability and possible use in a tree breeding program.

The system in use.—Up to this point numerous facets of plus tree

selection have been discussed and the most important criteria have been listed in the form of minimum requirements. In actual practice, the initial selection of a candidate tree is made simple for those engaged in the search for plus phenotypes. For example, an initial selection form (Fig. 2) which simply lists these minimum requirements, excluding the one on growth efficiency, seems adequate for helping the searcher eliminate all but the most promising phenotypes merely by a series of visual observations. If the candidate tree qualifies on these requirements, then the more time consuming quantitative measurements of growth and crown size are made. Essentially, the recognition of the requirements listed on the initial tree selection form is all that is required to adequately train field personnel in the initial selection of candidate trees.

Discussion

The system of plus tree selection described here is not a panacea for the many problems encountered in the search for and final selection of outstanding trees. The authors believe, however, that it is a definite improvement over the grade-point systems currently in use.

First of all, it gives adequate consideration to competition, a factor which cannot be lightly regarded in initial tree selection. The system places emphasis on the biological relationship between present crown size and mean current increment rather than some other quantitative measure of growth, although in our studies we also found the correlation between present crown size and gross volume to be almost as good as that between present crown size and basal area increase during the past ten years. In most cases, in fact, the data obtained on numerous plus tree selections indicate that individual trees fall almost in the same relative position whether the regression is based on crown size and basal area increase or crown size and total volume. Even though it is obvious that the present crown of a tree is not the same crown it has had throughout its life, in most cases it is probably a fairly good indication of the type crown the tree has always possessed. If an older tree now has a large crown, it most likely always had a large crown relative to other trees in the stand of the same age. Conversely, if a dominant tree now has a small crown, it is doubtful that its crown was ever large in relation to other trees of the same age. In essence, present crowns, especially crown widths, are a reflection of past crowns, shaped by heritable and past environmental influences and as such might be considered to be cumulative. The present volume of a tree is certainly an accumulation of past growth, and when these relationships are jointly considered the high correlation obtained between present crown size and total volume becomes less difficult to reconcile. The authors, however, still prefer to use the system of selection based on "growth efficiency" because the basal area increase/crown size regression more clearly depicts present performance of the most apparently efficient dominant or codominant trees in a given stand. It should also be pointed out that the simple crown measurements, i.e., length × mean radius over which basal area increase is plotted (Fig. 1) gives a

Form 10.721 (a) TEXAS FOREST SERVICE Date_____
Research and Education Department

Initial Tree Selection Form

Reported by _____ Organization _____

Species _____ Age* _____ DBH _____ Total Height _____

The candidate tree meets the following minimum requirements (check appropriate block):

	Yes	No
1. Possesses a greater total height than the largest dominant trees.		
2. Average crown diameter is smaller than other dominant trees.		
3. Bole is well pruned in comparison with adjacent dominant trees. Possesses few if any persistent branch stubs or excessive bumpiness around limb scars along the bole		
4. Limb diameters in the upper one-half of crown are no larger than adjacent dominant and co-dominant trees.		
5. A straight line drawn from the top of the merchantable bole to ground line would not leave the outer bole at any point.		
6. The bole is free of repeated short crooks, even minor in nature.		
7. The bole is free of spiral bark twist of one-fourth turn or greater along its entire length.		
8. Average limb angle is greater than 45 degrees with the vertical.		
9. The tree is free of ramiform branches.		
10. The tree shows no past evidence of disease or insect injury.		

What is the most outstanding characteristic of this tree? _____

Location:

Owner: _____

Address: _____ County: _____

Detailed location (nearest town, highway, farm road, unimproved roads, etc.): ____

Draw sketch on reverse side giving location in woods using paced distances from easily recognized reference points.

*Age of candidate tree must be the same or less than the age of the largest dominant trees in stand.

Mail this completed form to:

Forest Genetics Laboratory
Texas Forest Service
College Station, Texas

FIG. 2.—Initial tree selection form.

better measure of a tree's potentialities than the vigor ratio used by Rudolf (4) where d.b.h squared × height is plotted over crown diameter squared × crown length, although the latter is a perfectly valid approach to the problem.

Perhaps one of the most difficult concepts for some to accept is the fact that a selection could qualify on growth efficiency as a plus tree even if it were smaller at d.b.h. than the average of the largest dominant trees of the same age. This condition should cause little concern unless one tenaciously holds to the idea that selection for volume need not consider present crown size or any other quantitative measure of competition, past or present. It cannot be emphasized too strongly that individual tree selection for volume has no basis whatever unless the selected tree has demonstrated its potentialities to produce this greater volume with relatively fewer units of crown size. In other words, individual tree volume holds little significance to the forest manager on the basis of per acre yields if only larger but fewer trees on an acre still utilize all the available growing space.

To illustrate the point, one has only to consider the following hypothetical, yet quite possible, situation. Two perfectly straight, well-formed trees are growing side by side in an even-aged closed stand. Both trees are 40 years of age, and possess identical pruning ability with a 48-foot merchantable clear bole and a form class of 80. One tree is 14.0 inches d.b.h. with a mean crown radius of 5.0 feet, the other is 18.0 d.b.h. with a mean crown radius of 9.0 feet A tree grader interested in volume would select the larger tree without question, but the grader interested in growth efficiency and yields per acre would check the basal area increase/crown size ratio of each, and select the smaller tree if it proved more efficient. Choice of the smaller tree would not be a poor one if one could theoretically place similar trees in rows at constant spacing with complete crown closure; i.e., 435 14-inch trees with a total gross volume of 80,910 board feet (International) would be required to occupy one acre completely, whereas only 134 18-inch trees with a total gross volume of 45,024 board feet (International) could be placed on a second acre. Although the illustration overstates the actual case, it does demonstrate the importance of making quantitative measurements of crown size in plus tree selection, and illustrates the fallacy of assuming that the selected tree must always be larger at breast height than the average of the comparison trees or any dominant tree in the stand.

Another advantage in using a quantitative measure of crown size is that of selecting trees which demonstrably possess excellent pruning ability under competition, as reflected by total crown length irrespective of growth efficiency considerations. Trees with short, as well as narrow, crowns are much more valuable economically than trees of the same size with longer live crowns. This is certainly true in the case of high quality products such as poles and piles, and also in the production of lumber or pulpwood where total merchantable volume is directly influenced by the degree of natural pruning.

The adoption of a series of minimum requirements which state the lower limits of acceptability for various traits makes it easy to teach field personnel what is desired and eliminates much of the subjectivity found among different workers. A tree either does or does not qualify on a given trait; if it fails to qualify it is automatically rejected and no time is lost in searching for the next candidate. The system eliminates the necessity for assigning the responsibility of grading all trees to one person, since anyone that can differentiate between species can look at a tree and determine if it does or does not meet the requirements set forth before taking the final measurements on crown size and growth.

The system as used in the cooperative tree improvement program of the Texas Forest Service does not incorporate any minimum requirement for wood specific gravity in the selection of plus trees. The wood density of all selected trees is determined, however, and if the tree possesses either higher or lower than average wood density the plus tree is used with other, similar density selections in a breeding program designed to produce strains of either high or low density trees. It should be kept in mind that for every additional trait sought in any one field selection, the cost of such selection pyramids. Hence the tree selections in the Texas program are confined to phenotypes possessing exceptional vigor, based on growth efficiency and excellent bole form.

Summary

Consideration is given to several silvical influences bearing on the selection of plus phenotypes in even-age stands of southern pine. A system of individual tree selection is presented which compares the relative growth efficiency of a given tree with that of the largest dominant trees on the same site to give an indication of a tree's growth potentialities in the environment under which it exists. A series of minimum requirements is adopted which the candidate tree must meet in order to qualify as a plus tree selection and which helps reduce individual subjectivity of selection to a minimum.

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Application of Herbicides With Mist Blowers: A Promising Method for Releasing Conifers

William P. MacConnell and Robert S. Bond

AERIAL application of herbicides to release conifers has been successful in the Lake States (*3,4, 10*), the South (*11*), in Maine (*8*), and Rhode Island (*7*). Both fixed-wing aircraft and helicopters have been used in this work. Various tests have established spray formulations of 2,4-D and 2,4,5-T that are effective against hardwoods and do little damage to conifers if applied during the proper season. Spray mixtures have ranged from one to three pounds acid equivalent (one quart low volatile propylene glycol butyl ether esters) per acre in varying amounts of fuel oil or water or fuel oil and water. Applications have ranged from 2½ to 5 gallons of mixture per acre. Damage to conifers is insignificant if applications are made after the new growth has hardened off in late summer, and concentrations are not stronger than two pounds acid equivalent per acre (*2*). McConkey (*8*) found that with white pine about one-fifth of the terminals showed some injury when treated at the three-pound rate in Maine on July 14. In lower Michigan one pound acid equivalent of 2,4,5-T in 5 gallons of an oil-water mixture per acre gave good control of pole-sized maple and oak when applied in August (*3*).

Current application costs range from $4.92 (*11*) to $14.05 (*8*) per acre. Cost depends on these factors: concentration of chemicals, size and location of the area to be treated, and method of application. Application by fixed-wing aircraft on large areas can be accomplished for less than $5 per acre (*3,4,11*). Helicopter application for large areas costs $8 or less per acre (*7,8*).

Aerial application of herbicides has many advantages which have been described by Arend (*3*), Coulter and Ralston (*4*), McConkey (*8*), and others. Aerial application, however, has some disadvantages. Drift is so serious a problem that aircraft application of 2,4-D has been outlawed entirely, and strict limitations have been placed on ground machines in so-called "hazard areas" in California (*1*). Helicopter application in still weather, using low concentration of herbicide and large droplet size, reduces the hazard of drift. Invert emulsions of 2,4,5-T (*5*) which make a thick, creamy spray and reduce drift are available for field trials.

Interception of spray by the overstory becomes a problem if the objective is to control understory hardwoods. Overstory softwoods are not seriously damaged by the spray (*8*), but a dense overstory prevents good coverage of the understory. Better foliage penetration is achieved by helicopter application at slow speed to attain maximum benefit from rotor prop wash (*7*).

Large areas must be treated to make aerial spraying economical (*11*), and all hardwoods regardless of value on a treated area may be killed or damaged. Smaller areas may be sprayed by helicopter, but the cost per acre of marking the areas to be sprayed increases sharply as the size of the areas decrease. Other costs also increase when numerous small areas are treated by helicopter.

In this study two ground methods of herbicide application were tested in an effort to overcome these disadvantages and make foliage application of herbicides possible where aerial application is not practical or desirable. Standard tested mixtures for aerial applications were used in machines which put the material out in a fine mist similar to that applied from the aircraft.

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Equipment Used

A truck-mounted mist blower of the type commonly used to spray shade trees was tested in 1957. The blower, a self-powered unit which could be mounted on a tractor, jeep, or truck, was used. It delivered 10,000 cubic feet of air a minute at 150 miles per hour at the nozzle. Trees up to 70 feet in height can be sprayed with this type of machine (*6*). In this test good control of harwoods resulted 150 feet back from the road where the machine traveled.

Two shoulder-mounted mist blowers of Dutch manufacture, weighing 31 pounds empty, were used in tandem for the 1958 tests. The machines could deliver mist to a height of 20 feet in still air. In normal operating situations 2½ gallons of spray material were delivered in 30 minutes by each machine. Three men sprayed 96 acres in five days employing the two machines.

Spray Mixture

Four aerial type mixtures of spray similar to those tested by Coulter and Ralston (*4*) in lower Michigan were used in the truck-mounted mist blower tests on August 27, 1957:

Test 1: One pound (.25 gallon) 2,4,5-OS acid equivalent in 1.00 gallon fuel oil and 3.75 gallons of water applied at the rate of 5 gallons of mixture per acre assuming a 5-chain (330 ft.) depth of penetration from the location of the mist blower.

Test 2: Two pounds (.50 gal-

lon) 2,4,5-OS acid equivalent in 1.00 gallon fuel oil and 3.50 gallons of water applied at the rate of 5 gallons of mixture per acre, again assuming 5 chains of penetration from the location of the mist blower.

Test 3: One pound Kuron in the same quantities of oil and water as Test 1.

Test 4: Two pounds Kuron in the same quantities of oil and water as Test 2.

The 2,4,5-OS used is 2,4,5-T with an oil stable emulsifier which improves oil-water mixtures of the herbicide. Kuron is the propionic acid form of 2,4,5-T which is supposed to be more effective against maple and oak than the normal acetic acid form of 2,4,5-T.

Two spray mixtures were used in the shoulder-mounted machine tests from August 12 to August 20, 1958. One pound (.25 gallon) 2,4,5-OS acid equivalent in 2.25 gallons of fuel oil was applied at the rate of 2½ gallons per acre for most of the tests. One test using Kuron in place of 2,4,5-OS was made. Fuel oil only was used as a carrier for the herbicide to simplify mixing. One pound acid equivalent per acre was found adequate in the 1957 tests and in previous aerial tests (*3,4*). This low rate was also used so that conifers which might be caught directly in the blast of spray would not be severely injured.

Method of Application

In the 1957 tests the truck-mounted mist blower was operated from a woods road. A trial run was made with a nozzle attachment that gave a very fine spray which went only a short distance. With the nozzle removed the spray mixture flowed directly into the air stream producing larger size droplets, and greater distance was achieved. All subsequent strips along the road were sprayed without the nozzle attachment. The truck moved at five miles per hour spraying on both the forward and backward pass until all the mixture for a given strip was used up. Some softwood were in the direct path of the spray blast, and some large hardwoods intercepted the air stream and decreased the effective distance of penetration.

Spraying was done at an early hour to get still weather, but the wind ranged from 5 to 10 miles per hour during the tests. The vegetation selected for spraying was nearly all less than 20 feet tall, so that the machine could throw the material at a more nearly horizontal angle to obtain maximum penetration. With the wind good hardwood control was achieved up to 150 feet from the truck road; against the wind effective penetration was only 50 feet.

In the 1958 tests two shoulder-mounted mist blowers with detachable spray tanks were used by two men operating as a team. A third man serviced the machines, replaced empty spray tanks with full ones, refueled the motors when necessary, started them if they stalled, and packed five-gallon cans of spray mixture from the truck to strategic locations in the forest for filling the spray tanks. This team organization made for efficiency and kept the machines operating most of the time. It was hot, unpleasant work, since the loaded machines weighed 50 pounds, and the air was full of fine drifting oily mist. Respirators were used most of the time. Some spray material came in contact with the skin, but no irritations occurred.

Strips were run at 20-foot intervals; ten strips involving approximately 2,000 feet of travel covered an acre. This travel was carefully gauged to be accomplished in 30 minutes, because the mist blowers in normal operating situations put out 2½ gallons of material in one-half hour. Stand area was measured on aerial photos before spraying to help insure uniformity of coverage at 2½ gallons per acre. The two mist blowers were operated in tandem 20 feet apart. The man on the outside edge put out strips of toilet paper at frequent intervals to orient the inside man on the next strip. When desirable, toilet paper could be hung high on branches by putting it in the air stream of the blower. About 20 acres per day were treated over a five-day period. Twelve five-gallon cans of spray formulation were taken into the field each day, and two pack boards were used to carry the material back into the forest where necessary.

The Areas Treated and Conditions During Treatment

The area selected for treatment with the truck-mounted mist blower was a stand of eastern white pine and hardwoods which had suffered severe blowdown in the 1938 hurricane. On the ground was a dense mixture of pine and hardwoods about 20 feet tall with occasional larger trees of varying size up to two feet in diameter which survived the hurricane. There was enough pine to make a good stand if the hardwoods could be controlled. Hardwoods on the area were predominantly birches, maples, and oaks. A small amount of hemlock was also present.

Eight plots were located in pairs, one on each side of the road, to test the four spray mixtures already described and the method of applying them. Hardwood control within the limit of penetration of the spray, 150 feet down wind and 50 feet against the wind, was uniformly good on all plots. Damage to softwood was light.

Conditions for the test were not ideal. Wind at 5 to 10 miles per hour limited penetration on the windward side and probably carried the material too quickly away on the leeward side. Arborists usually limit their work with this machine to still conditions at daybreak, at night, and other times when the air is quiet. Control of hardwoods was promising, damage to softwoods was not severe, but the distance of penetration was disappointing; so it was decided to test other more portable machines the next year. The truck-mounted machine merits further trial, however, because it requires far less physical effort to operate than back-pack rigs, and it will throw the spray three times higher than can the portable machines currently available.

The seven areas treated by shoulder-mounted mist blowers from August 13 to August 20, 1958, represent a variety of condi-

tions where small portable mist blowers could be effective. A major limitation of this machine is the relatively low height to which the material can be carried in the air stream. Twenty feet of height is easy to achieve, thirty feet can be secured in still air by holding the nozzle still to let the air stream build up. The great advantage of shoulder-mounted machines is their portability (Fig. 1).

Area 1 was a stand of sapling hardwoods 20 to 30 feet tall over natural white pine 4 to 10 feet in height. Hardwood species were principally birches, maples, and oaks with a few aspen and ash. A hard driving rain interrupted the work at 4:00 p.m., and probably washed some of the spray material from the trees. The work in this stand continued next day on a damp foggy morning when the leaves were drenched with water. The leaves dried off during the day, but another hard rain fell at 7:00 p.m. The wind was still during this test.

Area 2 was an eight-year-old Norway spruce plantation invaded by hardwoods, white pine, and woody shrubs. The hardwoods were predominantly red maple and pin cherry with heights ranging up to 20 feet. Some parts of the plantation were heavily invaded by hardwoods, other parts had none. The machines were shut off where there were no hardwoods to kill. Stone walls through the area had hardwoods up to 50 feet tall which were also sprayed. The plantation rows served to locate travel lines for the machines. This work was done on a hot, muggy day. Wind movement was less than five miles per hour. The leaves were wet at the start and became dry during the operation. A hard rain fell that evening at 7:00 p.m.

FIG. 1.—Shoulder-mounted mist blower in operation on Area 7 with the spray directed into the upper crown canopy.

Area 3 was a natural stand of white pine invaded by aspen, gray birch, pin cherry, and a few white birch and red maple. The pine was 15 to 20 feet tall; the hardwoods were 20 to 40 feet tall with diameters ranging from 2 inches to 12 inches. In most areas the hardwood existed as single scattered trees not severely competing with the pine. In other areas the hardwoods were more dense, of larger size, completely overtopping the pine. The trees were wet, and the weather was foggy while the work progressed. Later in the day the trees dried out, and they were fairly dry by 2:00 p.m., when a shower occurred. Wind movement was less than five miles per hour.

Area 4 was a natural stand of pine ranging from seedling size up to 18 feet in height. Pine stocking ranged from very sparse to very dense. The hardwoods present were of the same general height or overtopping the pine. Species were predominantly gray birch and red maple with occasional other birches and oaks. There was an abundance of other woody plants like huckleberry and sweet fern in the more open situations.

The wind ranged from 10 to 20 miles per hour and seemed to carry the mist away from the lower vegetation such as huckleberry, which occurred in pure stands about 3 feet tall. The huckleberry was not affected by the spray. None was found to be damaged on 15 plots.

Area 5 was a pine stand cut in the winter of 1957 by the shelterwood method. Sparse pine and hardwood regeneration was present. Most of it, small in size and not very evident at the time of cutting, was beginning to grow well at the time of spraying. The wind was still during the spraying. Rain fell that evening.

Area 6 was a 20-year-old pine and hardwood stand of the same general height, with some larger overtopping hardwoods. Tree species represented were red maple, gray birch, pin cherry, red oak, and white oak. The day was cool; wind was 10 to 20 miles per hour. No rain fell for several days

after the spraying.

Area 7 was a 40-year-old pine and hardwood stand with the hardwoods in the upper crown canopy. The stand was composed of red oak, white oak, and red maple. Black birch, gray birch, white birch, and yellow birch were also present along with beech and pin cherry. The weather was the same as for Area 6. This area was treated with Kuron at 1 lb. acid equivalent per acre. All the others were treated with 2,4,5-OS at the one-pound rate.

Results From the Truck-Mounted Mist Blowing

There was little difference in hardwood control between one-pound and two-pound concentrations of 2,4,5-OS and Kuron (Table 1). Kuron was less effective than 2, 4,5-OS in killing large trees. Pine in the direct blast of the spray showed some damage after three weeks, but this was very difficult to detect a year after the spraying. Hemlock in the direct blast showed greater damage, and a few of the damaged terminal buds did not put out new growth the following year. Parts of these trees were soaked to the running off point with spray. Scattered cull hardwood trees up to two feet in diameter were killed. The line of killing spray penetration was fairly sharp, and some trees at maximum penetration distance were damaged on one side only. White oaks, which proved most susceptible in all tests, were killed beyond the line of general killing penetration. The tops of larger trees above the general crown canopy beyond this line showed some damage.

Spray mixtures were formulated assuming a 5-chain penetration of spray from the truck location. Less than one-half that depth of penetration was achieved. No reasonable estimate of spray concentration per acre could be made, because there is no way of knowing how much spray material blew out of the area. Hardwood control by this method was excellent, and this machine can be used where it can be taken into the area to be treated. If well protected the machine could travel on or behind a tractor and go most anywhere in the forest.

More sprouting occurred on the truck-mounted mist blower tests, perhaps because the tissues died before they could carry the chemical to the roots. Spray concentrations were strong and foliage browning was very rapid. Low brush had most sprouting with progressively less sprouting in the larger size classes. Only one area had sprouts on trees 2 inches or more at d.b.h. Sprouting does not appear to be a serious obstacle to hardwood control with mist blowers.

Results From the Shoulder-Mounted Mist Blowing

Results (Tables 2, 3) were determined by the method suggested by Roe (*9*). Seventy-four concentri circular plots were measured early in September the year after spraying. Low brush was measured on .001-acre plots (radius 3.72 feet), high brush on .005-acre plots (radius 8.33 feet), and trees on .05 acre plots (radius 26.3 feet). The plots were mechanically located by compass and pacing.

The oaks proved to be most susceptible to the herbicide. Some oaks up to 60 feet in height were killed, where the maximum height of other species killed was 30 feet. Aspen was the most resistant tree species to the spray. Woody shrubs like huckleberry, blueberry, sweet fern, and laurel were less damaged than hardwood tree species of the same size. More effort to get the material directly on the lesser vegetation would probably improve control of this material. In the work, machine operators were instructed to direct the spray at hardwoods interfering with the growth of softwoods, and as a consequence the spray was seldom directed at the low brush.

Pine, hemlock, and spruce caught directly in the blast of the spray and wetted to the point of runoff were temporarily damaged. Needles quickly browned, and the stems of some leaders and side branches browned also. These trees were marked for observation during the next growing season. Little damage was apparent at that time. Five softwoods were recorded as damaged on the 72 plots. One of

TABLE 1.—EFFECTIVENESS OF TRUCK-MOUNTED MIST BLOWER APPLICATIONS OF HERBICIDE 2,4,5-OS (Area #1 at 1 lb. per acre; Area #2 at 2 lb. per acre)

Test area	Low brush (0.6 ft. to 0.5" d.b.h.)										Tall brush (0.5" d.b.h. to 1.9" d.b.h.)								Trees (2.0" d.b.h. and up)							
	Dead[2]		Severe[3]		Light[4]		None[5]		Sprouts[6]		Dead		Severe		Light		None		Dead		Severe		Light		None		Sprouts	
no.	S/A[1]	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%
1	58	63	16	17	3	3	16	17	19	20	80	64	26	21	13	10	6	5	13	10	19	54	10	29	6	17	---	---	---	---
2	77	64	24	20	14	12	5	4	26	22	96	90	2	2	7	6	2	2	26	24	24	83	5	17	---	---	---	---	---	---
Kuron (Area #3 at 1 lb. per acre; Area #4 at 2 lb. per acre)																														
3	75	75	8	8			17	17	33	33	58	70	---	---	17	20	8	10	25	30	25	76	---	---	8	24	---	---	---	---
4	53	55	10	10	13	14	20	21	20	21	50	72	3	4	10	14	7	10	---	---	26	100	---	---	---	---	---	---	---	---

[1]S/A—Stems per acre.
[2]Dead—80% or more defoliated.
[3]Severe—50% to 80% defoliated.
[4]Light—20% to 50% defoliated.
[5]None—Less than 20% defoliated.
[6]Sprouts—If present.

TABLE 2.—EFFECTIVENESS OF BACK-PACK MIST BLOWER APPLICATIONS OF HERBICIDE

2,4,5-OS at 1 lb. per acre

Test area	Low brush (0.6 ft. to 0.5" d.b.h.)										Tall brush (0.6" to 1.9" d.b.h.)										Trees (2.0" d.b.h. and up)									
	Dead[2]		Severe[3]		Light[4]		None[5]		Sprouts[6]		Dead		Severe		Light		None		Sprouts		Dead		Severe		Light		None		Sprouts	
no.	S/A[1]	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%
1	167	33	167	33	167	33	—	—	167	33	266	20	133	10	666	50	266	20	67	5	248	50	82	16	79	16	89	18	—	—
2	2300	39	1800	31	600	10	1200	20	700	12	420	30	200	14	60	4	740	52	20	1	58	33	46	26	38	21	36	20	—	—
3	1000	89	—	—	125	11	—	—	125	11	200	47	50	12	75	18	100	23	50	12	30	36	15	18	18	22	20	24	—	—
4	67	6	334	29	467	41	267	24	—	—	332	49	53	8	93	14	200	29	13	2	116	39	58	19	81	27	46	15	—	—
5	312	58	—	—	—	—	224	42	78	15	62	68	15	16	—	—	15	16	15	16	26	53	9	19	6	12	8	16	—	—
6	2340	35	780	12	1092	16	2496	37	468	7	832	72	169	15	92	8	62	5	246	21	225	60	69	19	53	14	27	7	21	6
Aver.	1031	39	513	20	408	15	696	26	256	10	352	36	103	10	303	31	230	23	68	7	117	47	46	19	46	19	38	15	4	2
											Kuron at 1 lb. per acre																			
7	333	43	111	14	222	29	111	14	111	14	466	78	89	14	22	4	22	4	44	7	128	28	88	19	156	34	86	19	—	—

[1]S/A—Stems per acre.
[2]Dead—80% or more defoliated.
[3]Severe—50% to 80% defoliated.
[4]Light—20% to 50% defoliated.
[5]None—Less than 20% defoliated.
[6]Sprouts—If present.

TABLE 3.—EFFECTIVENESS ON SPECIES OF BACK-PACK MIST BLOWER APPLICATIONS OF HERBICIDE

2,4,5-OS at 1 lb. per acre

Species	Low brush (0.6 ft. to 0.5" d.b.h.)										Tall brush (0.6" to 1.9" d.b.h.)										Trees (2.0" d.b.h. and up)									
	Dead[2]		Severe[3]		Light[4]		None[5]		Sprouts[6]		Dead		Severe		Light		None		Sprouts		Dead		Severe		Light		None		Sprouts	
	S/A[1]	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%	S/A	%
Alder	31	67	—	—	15	33	—	—	—	—	9	29	3	10	3	10	16	51	3	10	—	—	—	—	—	—	—	—	—	—
Aspen	46	100	—	—	—	—	—	—	—	—	12	40	—	—	6	20	12	40	—	—	1	12	2	25	2	25	3	38	—	—
Birch black	—	—	—	—	—	—	—	—	—	—	6	67	—	—	3	33	—	—	—	—	6	55	1	9	3	27	1	19	—	—
Birch gray	31	100	—	—	—	—	—	—	31	100	56	40	25	18	53	38	6	4	—	—	24	42	10	17	14	24	10	17	—	—
Birch white	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	67	3	33	3	33	6	37	3	19	4	25	3	19	—	—
Cherry	31	33	—	—	31	33	31	33	—	—	62	78	6	7	3	4	9	11	3	4	10	37	10	37	5	18	2	8	—	—
Maple red	62	40	31	20	31	20	31	20	15	10	140	66	37	18	9	4	25	12	40	19	39	54	14	19	12	17	7	10	4	6
Oak red	15	100	—	—	—	—	—	—	—	—	28	61	3	6	3	6	12	27	3	6	17	80	2	10	2	10	—	—	—	—
Oak white	92	100	—	—	—	—	—	—	—	—	37	100	—	—	—	—	—	—	3	8	9	82	1	9	—	—	1	9	—	—
Shrubs	416	32	216	16	262	20	416	32	62	5	40	50	6	7	19	23	16	20	3	4	—	—	—	—	—	—	—	—	—	—

[1]S/A—Stems per acre.
[2]Dead—80% or more defoliated.
[3]Severe—50% to 80% defoliated.
[4]Light—20% to 50% defoliated.
[5]None—Less than 20% defoliated.
[6]Sprouts—If present.

TABLE 4.—PER ACRE COST OF BACK-PACK MIST BLOWER APPLICATION OF 2,4,5-OS

Item	Cost
1 pound 2,4,5-OS acid equivalent @ $45.00 per 5 gal.	$2.25
2¼ gallons of fuel oil @ $.20 per gal.	.45
Labor costs: 3 men @ $60.00 per day	3.23
Machine cost; operation ($.05), depreciation ($.38) maintenance ($.04)	.47
	$6.40

these had the terminal killed. Most damage occurred in tight spots where the operator had to "bull" his way through tangled underbrush and vines and was more concerned with his footing than with direction of the spray. Hemlock and spruce are more susceptible to damage than pine. Damage to softwoods as a whole was very light; none were more than 20 percent defoliated.

All the sites treated had sufficient hardwood control to release the softwoods except on Area 7, and even here 48 percent of the broadleaf trees were severely damaged or killed. The lesser degree of control in Area 7 is attributable to the size of the material treated. The crown canopy of the 40-year-old stand of pine and hardwoods was 40 to 50 feet above the ground and for the most part beyond the effective range of the equipment. Good hardwood control was achieved in other stands up to 30 feet in height. In Area 7 under optimum conditions trees in excess of this height were killed, but in general 30 feet seem to be the ceiling for satisfactory operation of the back-pack mist blowers currently available. Taller stands should be treated from the air or with larger blowers. It is noteworthy also that in Area 7 a very high proportion (93 percent) of the tall brush was killed or severely damaged, because here the mist was confined within the stand under the crown canopy of the trees overhead. Some of the shorter pines prevented penetration of spray to the taller hardwoods in the overstory.

Reasonably good selectivity can be exercised with shoulder-mounted mist blowers. By shutting off the flow of spray, areas of desirable hardwoods as small as one-tenth acre in size can be reserved in the midst of a large treated area. The larger truck or tractor-mounted blowers are less selective; helicopters are still less selective; and fixed-winged aircraft are the least selective of all.

Cost

Not enough work was done with the truck-mounted mist blower to derive reliable cost data. With the back-pack rigs 96 acres were sprayed at a cost of $6.40 per acre using two machines and a three-man crew (Table 4). The cost per acre would increase if a single machine were used.

Summary and Conclusions

Herbicides may be applied with mist blowers to control hardwoods at costs which compare favorably with aerial applications. Some of the disadvantages of aerial application can be overcome by this technique; notably, the problems of drift, interception of spray by the overstory, lack of selectivity, and the requirement that a fairly large unit be done at one time. Both truck-mounted and back-pack mist blowers can be used to apply the spray material with good results. Spray mixtures of the type used from the air gave satisfactory hardwood control when applied from the ground by mist blower. An effective and economical field technique of using back-pack mist blowers was developed. A large blower was successfully operated from a truck on a woods road, achieving penetration into the stand up to 150 feet from the point of spray application. This machine should probably be operated from a tractor to gain greater mobility in areas not accessible by truck. Back-pack mist blower operation is hot, unpleasant work; operation of the larger machine is easier. The larger machine will control hardwoods 70 feet in height; whereas, the practical maximum for the smaller machine is 30 feet. Hardwood control was successfully accomplished under a wide range of mixed forest conditions with applications made in August. Sixty percent or more of the hardwood trees were severely damaged or killed in the treated areas. Damage to softwoods was negligible at this season of the year. Norway spruce and eastern hemlock were more susceptible to damage than eastern white pine. Ground application of herbicides by mist blowers to control hardwoods should extend the use of chemical foliage sprays to areas where aerial spraying is not possible or desirable.

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Negotiating Public Utility Easements on Timberlands[1]

Bruce J. Bayless

PUBLIC UTILITY easements on forest ownerships are an increasing problem in industrial timberland management. To minimize the cost impact of an easement on wood production the woodland manager must seek the most advantageous settlement for his firm, both in terms of reimbursement and contractual arrangements. The contractual arrangements may have the greater significance. Once reimbursement for loss is made, the effect of the reimbursement ceases while the cost of easement management, including taxes, continues as an annual cash burden against current wood production without making any contribution to actual wood yields. By reinvesting the settlement payment its earnings may, in part or entirely, offset the continuing cost of ownership and management. Even so, these earnings may not be adequate to provide a net profit for the effort.

Much of the precedent in compensation for public utility easements is based on continuing use of the land of the easement for agricultural production. Establishment of such easements on forest lands, however, ordinarily terminates wood production. Only low herbaceous species, or preferably grasses, are encouraged. Existing trees are cut; sprouts and seedlings are poisoned. For all practical purposes, the forest owner must make a perpetual grant to the utility; he relinquishes rights and benefits, but not the responsibilities of ownership.

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[1]Based on Master thesis. State University College of Forestry, Syracuse, N. Y. 1959.

"An easement is a limited right of use in the land of another" (*1*). When utilities meet the requirements for legal status as public service corporations, they have the right to initiate proceedings to condemn private property to obtain easements for their essential use as an exercise of the state's sovereign authority of eminent domain.

Practices of Public Utilities in Easement Acquisition

Basically, a public utility operates as other private enterprises in attempting to maximize profits. The Public Service Commission permits unit rate adjustments to cover reasonable costs of operation plus a fair profit return, but the utility is required to justify its costs. In order to justify its easement costs the utility strives to keep them as low as possible and consistent with local values.

The utility prefers a negotiated settlement rather than court action due to (1) the adverse effect of court action on its public relations, and (2) the fact that the cost of court proceedings may exceed the alternative of paying damages at a level acceptable to the private landowner. In the case of Louisiana Power and Light Company v. Simmons (*6*), for example, the Appellate Court assessed even higher damages than the lower court and assigned all court costs to the utility. In general, public utility firms realize that they do not fare well with a jury composed of the landowner's peers. Partly, this is an expression of the power of public opinion to provide a control over unbridled condemnation and arbitrary damage settlements by utilities.

Ordinarily, the utility approaches the woodland owner with an easement deed on a standard printed form. Only information peculiar to each property and owner, and the type of transmission line, needs to be inserted. The deed form normally grants construction and access rights, the right to trim trees and to control trees and brush by manual, mechanical and chemical means, and prohibits use of the easement which would interfere with the transmission facilities. No buildings may be constructed on the easements, but the grantor is allowed to cultivate the land. The form deed also stipulates that the grantor warrants the title. Generally, a deed is designed for the benefit of the party who prepares it. Standard easement deeds prepared by the public utilities are notably lacking in conditions designed to protect the landowner.

The actions of the firm which plans only one transmission line through an area with no thought of returning for further easements appear to show less consideration for the landowner. Such a firm may make one low offer to the landowner, and resort to court action, or at least a concrete threat of court condemnation, if the arbitrary terms offered are not accepted.

On the other hand, in one study area a utility provided precise deed information on the width of its easement, and good data on the location. Owners were offered fifty cents per linear foot for an easement width of about 170 feet, or about $128 per acre. Meeting an owner's resistance, the utility doubled its offer in many cases. In this area the best agricultural land sold for $200 per acre. The land traversed by the easement was somewhat less productive than that valued at $200 per acre. The ac-

tions of the construction crew were exemplary, and the utility was prepared to make additional payment for any damages associated with the construction. In its operation manual, this firm instructed its agents that the landowner has the right to assume that the company's agent negotiates in good faith.

Usually a utility pays the owner for cut merchantable timber and then returns ownership of the severed materials to him. No explicit recognition is made for loss of future growth or loss of immature trees. However, the return to the landowner of the severed timber may be an implicit recognition that the loss is greater than the market value of the cut timber alone. Or it may only mean that the utility believes the cost and problem of marketing forest products from a long narrow strip would impose a management burden exceeding the value of the materials.

In general, reimbursement is composed of two parts: payment for an easement and payment of damages. The utility often strives for a flat rate of payment for the easement itself, plus a payment for damages according to appraised and negotiated settlement values. There appears to be room for flexibility in the terms of the agreement, as well as in the payment for damages. Price flexibility for damages plus the easement, however, ends at about $300 per acre. Observations disclose that price differentials are greater between localities than between utilities, and prices are correlated with local market prices for land. Little differentiation is apparent in payment rates to corporate owners as distinguished from other private owners. And within an area, there appears to be little differentiation in payment between agricultural and forested lands.

Actually, payments do not appear to be based entirely on land values and appraised damages. Other factors such as the value of the right-of-way for power transmission purposes, the value to the utility of favorable public opinion which is generated by amicable negotiation, and the alternative cost of court proceedings, may have influence on the level of payment utilities will grant for easement settlements.

Legal Precedent

The actual exercise of eminent domain is the ultimate recourse of the public utility in acquiring easements. A utility which has local distribution facilities, however, will resort to court action only in extreme situations. The sole defense of an owner against condemnation is to prove that the utility has not been duly authorized by the State to initiate condemnation proceedings or that the proposed use of the property is not a public use. Since this is generally not the case, the area for settlement is usually limited to the compensation to be paid for the easement and the resultant damages.

Early cases established simple, unsophisticated formulas for the measurement of damages. Lambeth v. Southern Power Company (5) assessed damages as the difference between the fair market value before and the fair market value after the establishment of the easement. "Fair market value" is generally defined as the price acceptable to a willing buyer and a willing seller. In this same case, benefits accruing to the owner as a result of the construction of the right-of-way were accepted by the court as partial compensation, provided that these benefits accrued only to the specific grantor. The court did not query the grantor on the fair market value he assigned to these benefits nor to his desire or need for them. A later case (8), however, ruled that compensation must be paid the owner in money; other benefits could not be accepted in lieu of remuneration. In Central Georgia Power Company v. Mays (2) the court ruled that damages are recoverable by an owner whenever there is a physical disturbance of the right of property. It was also ruled that the willingness or unwillingness of a property owner may not be considered a factor in arriving at a figure for damages.

In Illinois Power and Light Company v. Peterson (4) no compensation was allowed for depreciation in value, other than for tower sites, because there was no abatement of taxes due to the presence of the lines. According to this ruling, payment of damages is a recognition of the decrease in value of real estate. Yet, in Wyoming County, New York, in no case was there a change in land assessment as a result of the erection of a power line! As is often the case, the assessments were not based on full market value. One owner, whose land (exclusive of buildings) was assessed at $800 received a payment of $2650 for an easement. The land continued at the $800 assessment after the construction of the power line.

In a modern case (6) the lower court allowed for the value of the merchantable timber removed from the right-of-way and granted a twenty-five percent allowance for the loss of future growth. The record neglected to explain how this percentage was to be applied. Additional awards were based on the value of the parcels for future homesites, at varying rates. One tract was best adapted to agriculture and since agricultural pursuits on the parcel were not prohibited, a lower payment was allowed than on the other tracts involved. The timber tracts were described as cut over, but apparently some merchantable timber remained on a productive site. This easement prohibited continued timber production. The utility appealed the decision, contending that the lower court had erred in its awards, including error in allowing for young timber that would become merchantable in the future. The Appeals judge approved this contention and ruled that market value of a property must be determined as of the date of institution of the suit. He disallowed damages for the loss of young growth which would have been merchantable in a few years. In a general comment on utility easements on forest land this Appeals court ruled "there was for practical purpose no difference between value of servitude and value of fee," therefore ruling that the

lower court had not erred in allowing full fee value though only servitude was appropriated.

Unfortunately for precedent in appraising forest damages, the figures in the foregoing case had little basis in forest values. Actual value determination was based on the price that a neighbor had received for a building lot and the adaptability of this land for home sites. Apparently the court saw no inconsistency in accepting the land's possible potential for building sites (contested as speculative by the utility) and yet disallowing future timber values. The decision indicates that the court did not have an understanding of modern forest management and accounting procedures. This is not an unique instance of the difficulty confronting foresters in promoting acceptance of improved forest practices.

In Mitchell v. Texas Electric Company (*7*) the court ruled that an easement being in law less than fee title can in law only entail compensation for less than fee value. The Woodlands Manager of Firm M contends that since a woodland owner retains the responsibilities of ownership, easement compensation based on full current market value is inadequate.

Legal research discloses no court rulings which specifically allow for the present worth of future forest values. However, out-of-court settlements have been made in which the appraisal of damages included a consideration of future values.

Unscrupulous agents for utilities in some cases have attempted blanket easements so vague that the utility could later select the route for the location of the line. An early ruling (*3*) requires that the consideration be stated and that the easement be legally described in order to constitute a contract. Without a description of the right-of-way location, the deed may be set aside under the Statute of Frauds for insufficiency. Despite these rulings, some deeds recorded by utilities in New York within the last ten years fail to adequately describe the right-of-way or the land for which the easement was contracted.

The Easement Agreement

Despite the general impression of the inevitability involved in eminent domain, and the fact that the utility approaches the landowner with a form deed, the terms of the agreement are open to negotiation. Except for a few basic points, the terms other than financial may be determined by the grantor. For example, Firm J, a paper company operating in New England, refuses to grant a warranty deed, though this is specified by many utilities. Firm J requires the utility to provide a survey, a survey map and a legal description of the planned easement. Another provision of Firm J's deed is a reversion clause stipulating that if the easement is not used for its intended purpose for one year, it will revert to the grantor.

Firm P, likewise, does not accept the deed proffered by the utility, but prepares its own deed peculiar to the circumstances. In addition to considerations mentioned above, Firm P stipulates the following:[2]

"1. Gas lines shall be buried deep enough so that heavy logging equipment will not damage them; at least twenty-four inches below the surface.

"2. The surface shall be restored to its natural contour after the lines are buried so that the firm's operations shall not be hindered.

"3. Stumps and boulders shall be removed or disposed of on the property.

"4. Stumps and debris shall not be bulldozed to the edge of the easement as this can hinder forestry operations.

"5. The utility must get the firm's approval for any application of spray brush control.

"6. The forest company reserves the right to grow nursery stock on the easement to a height of twelve feet.

"7. In entering the lands for construction, maintenance or operation of the line, agents of the utility shall follow as closely as practicable the right-of-way granted and shall not enter other lands of the forest company.

"8. Disputes shall be arbitrated according to procedures outlined in the deed."

The practices of Firm J and Firm P indicate that careful attention to the details of the easement deed can prevent misunderstandings and can ameliorate future management problems. Knowledge of the conditions a landowner can impose on the utility can provide greater long range benefit to him than knowledge of techniques for exacting higher financial settlements.

Determining Compensation

Various firms utilize different factors in calculating their losses which are to be reimbursed by the utility. While the courts have not recognized net worth of future forest growth, utilities have accepted values determined according to this principle in out-of-court settlements. In many instances the forestry firm receives a stumpage payment for the timber cut and then acquires title to the cut material. Additionally, firms seek reimbursement for the loss of future values. In calculating the present worth of this loss firms attempt to captalize the future income that the land would have produced. One firm receives a sum representing the stumpage value of the present stand of timber, the net present worth of future forest growth (i.e. the net capitalized value of the bare land) in addition to a sum representing the capitalized value of future tax costs.

Firm P, operating in the Northeast, attempts to have the settlement reflect the following costs:

"1. Loss of annual yield from the right-of-way.

"2. Expense of protecting the pipe line at road and skid crossings in the course of managing adjacent forest lands.

"3. Damage to company road systems caused by maintenance crew's use.

"4. Loss in annual yield of the temporary working right-of-way.

"5. Reduction of growth and site quality of adjoining stands."

Another expense to the forestry firm is the cost of processing the easements. The larger and more

[2]Correspondence, May 1959.

complex the organization, the greater the cost. Since most of the expense involved is not related to the acreage of the easement, the smaller the easement, the greater is the per acre cost of the processing. One firm requires the following procedure in processing an easement: the engineering must be checked out by field personnel; the agreement must be approved by the local forest supervisor, the district forester, the land department, the woodlands division, the local legal department, the resident manager, the legal department at the company's main office, a company officer, and in most instances the capital expenditure committee.

Compensation Values

Compensation rates for easements on woodland vary from no remuneration to as much as $300 or even $500 per acre. A Southeastern firm has encountered many small easements which it granted gratis in the interest of good neighborhood relations. These grants involved service line easements to an adjoining owner's house. A utility operating in New York offered owners ten dollars, plus one dollar per linear rod, which constituted about eighteen dollars per acre. Firm J received $35 per acre for a telephone line easement in New England. Power transmission easements for the Southeastern firm have entailed settlements of $100-$175 per acre, plus title to the severed forest products. Firm M in the Northeast seeks $160 per acre plus the stumpage value of the severed forest products. In the same state, Firm P in 1954 received $187.50 for a 969-foot easement ($535 per acre) and $862.70 for a 6,016-foot easement ($392 per acre).

Firm P reports that more recently it has attempted to negotiate easements on the basis of an annual rental payment of five dollars per acre. A gas transmission firm has been unwilling to accept this arrangement. In addition to the rental, the utility is required at the time of line construction to cut, buck, and skid forest products from the right-of-way and to deck them at convenient loading points. The firm then pays the utility the usual piecework rate for this service. Firm P did not indicate its basis for justification of the five-dollar rental. Presumably, this figure accounts for the loss of the growth foregone, damages to the remainder of the property and the tax cost on the area in the easement.

A rental seems a neat solution to a complex problem. On further analysis, however, at five percent interest (a figure not supplied by the firm) the rental capitalizes at only $100 per acre. At three percent the payment capitalizes at $167. Neither of these figures takes into account the federal corporation tax of 52 percent to which rental income is subject. After income taxes, the capitalized value of the rental would be much lower than the above amounts. On the other hand, lump sum settlements for easements may be treated as involuntary conversion sales and if the funds are reinvested in timberlands, there is no tax on any capital gains which may have resulted. The lump sum payments previously received by this firm (i.e. $535 and $392 per acre) are obviously higher than the capitalized value of the five-dollar rental. Their $535 lump sum payment would be equivalent to a net annual rental of $26.75, at a five percent discount rate; to net this sum a gross rental before taxes of $55.70 would be required. Furthermore, the lump sum, placed in another investment, would be a better hedge against continuing inflation than a fixed annual rental.

Firms tend to bargain for an easement settlement in terms of the losses of present and future forest values. The actual payment may exceed this rationally calculated amount, and often approaches a figure which may represent a "market price" for utility easements. The utility reinforces this concept by its willingness to settle for an amount somewhat higher than the appraised forest loss. The reluctance of woodland owners to convey easements at amounts equalling their appraised losses may imply that they too recognize a market value for utility easements, a value which may exceed their own calculated losses. Perhaps the reluctance to settle for appraised losses is evidence that they have not calculated the effect of the loss on their total enterprise, or that they have not evaluated and included the processing costs discussed above.

Current appraisal data and compensation recorded in deeds in the Northeast indicate that public utilities engaged in distribution locally (retail) will not seriously question appraisal methods nor contest a forestry firm's settlement demand if the total payment for easement and damages does not exceed $200 or $300 per acre. Elsewhere the limits may be lower.

Conclusions

No evidence was found that courts have admitted the present worth of future forest values as a factor in determining settlements for utility easements on forest lands. There appears to be no legal precedent for the use of forest evaluation formulas normally used in forest management. In settlements which did not reach the courts, grantors have been compensated for calculated future forest values. However, there was no indication that the utility determined payment on the basis of such appraisals or whether it merely accepted the grantor's appraisal as consistent with its own estimate of the value of rural easements for its purposes. This suggests that the value of a right-of-way for public utility purposes ordinarily exceeds and is independent of its value for forest use.

Generally forest managers are opposed to the granting of easements and seem to have a defensive attitude toward the use of forests for such purposes. However, the utility seems prepared to meet the highest damage payment, based on current valuation techniques, that the forester can justify, thus absorbing some of the force of his objections. Under such conditions, perhaps the forester should be favorably disposed from the economic viewpoint toward the granting of easements. He receives full compensation for losses he quantifies and may reinvest the funds in other lands, or in investments of other types. Reinvesting the funds in

other lands imposes no tax liability on any capital gain created by the involuntary conversion. This course might be recommended particularly where an easement doesn't seriously impair the management of the remainder of the forest from the cost standpoint, or prejudice the firm's wood requirements. It may be appropriate from the aspect of business operation to offer resistance in order to obtain maximum remuneration. It is the responsibility of the land manager to his employer to maximize the settlement; this indicates that he should strive to obtain the highest possible payment even though this amount is based on non-forest use. A rental payment for the easement would be suitable only if related to a price index so as to minimize the effect of inflationary trends and if the payment were high enough to provide the same after-tax benefit as a lump sum payment.

Initially it appears that all advantages of a servitude accrue to the utility and all disadvantages to the forest owner. A utility might consider it more advantageous to acquire fee title to forest lands, since it often pays the equivalent of a fee title plus an amount representing the capitalized property tax. Ownership in fee of a long strip of property could be of strategic advantage in an area.

Some advantages in granting an easement instead of a fee title accrue however, to the forest owner. As illustrated in the conditions of the easement deed used by Firm P, the forest owner can retain on the easement a measure of control over the actions of the utility. Fee ownership by the utility could preclude use of the easement surface by the forestry firm.

An increase in the information available to a forest landowner can assist him in obtaining payments which he considers just. If an industrial owner can quantify the effect on its total enterprise of the surrender of a part of its forest productivity, an important advance will be achieved toward financial compensation for these losses. Knowledge of contractual methods used by other owners can assist the grantor in regulating the activities of the utility on his property.

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Professional Income of Scientists

The National Science Foundation in its "Scientific Manpower Bulletin," No. 12, December 1960, reports on salaries received by scientists. Gross professional income (salary plus consulting fees, honoraria, etc.) to the nearest $1,000 is given for 1959 and salary only for 1960. Income is shown for 15 different fields, including agricultural sciences which encompasses forestry. Incidentally, agriculture comprises the lowest category (median $7,000) and medical sciences the highest (median $14,000) for gross professional income in 1959. Income distribution is also given by 10th, 25th, 50th, 75th, and 90th percentiles. Professional income for agricultural sciences for the 90th percentile (upper decile) is shown as $12,000 and medical sciences as $27,000.

How do these figures compare with the results of the SAF survey of professional income of foresters reported in the December 1960 JOURNAL OF FORESTRY? In the first place, caution should be used in making such comparisons. To get on the roster of scientific manpower, one usually has to have a Ph.D. degree or a lower degree plus several years of experience. No such restriction was placed on the SAF study of professional income. As a result the SAF study is much more heavily weighted with men of less experience. Even so our overall median salary for foresters was $7,310 compared to $7,000 shown for agricultural sciences in the National Science Foundation report. For the upper decile the figures were $11,610 and $12,100, respectively, for foresters and agricultural scientists. In other words, foresters earn about as much as others among the agricultural sciences, but not as much as those in other fields.

For all scientific fields combined, the Manpower Bulletin indicates a gross median income of $9,000 for holders of bachelor and master degrees and $10,000 for the Ph.D. degree. The SAF study showed that a forester with a bachelor degree received a median annual income of $7,030, master $7,770, and doctor $9,710. In the Scientific Manpower study scientists employed in business and industry reported the highest median salaries—the self employed being at the top. The same trend was exhibited in the SAF survey of professional income of foresters.

F. H. EYRE

Controlled Burning and Watershed Condition in the White Mountains of Arizona

Charles F. Cooper

THE USE of controlled fire as a management tool is gaining increasing acceptance in the ponderosa pine forests of southwestern United States. Since 1950 more than 150,000 acres on the Fort Apache Indian Reservation have been treated with controlled fire, primarily to reduce wildfire hazard. These forest lands, lying in the White Mountains at the source of the Salt River, are vital to the water economy of Arizona. Possible effects of the controlled burning program on watershed condition can be summarized under three major headings: soil erosion, depth and water-holding capacity of organic matter on the forest floor, and interception and use of water by vegetation.

There is little quantitative information about the effects of moderate fires on soils or watershed condition in the western mountains. On ponderosa pine sites in California treated with prescribed fire, Biswell and Schultz (*2*) found no indication of surface runoff or erosion that could be related to the burning itself. A sufficient layer of partially decomposed duff remained after burning to maintain high infiltration and percolation rates. Surface runoff and some soil movement were noted wherever roads, skid trails, or other disturbances had exposed mineral soil. Weaver (*8*) likewise observed that the first prescribed burning experiments on the Fort Apache Indian Reservation led to no evident accelerated erosion.

Dryness and Youngberg (*3*) made a detailed study of the effect of slash burning on soil physical properties in the Douglas-fir region of Oregon. They found that severe burning, which completely removed the surface organic layer and left the soil highly colored, was the only treatment that had any significant effect on soil structure, particle size distribution, or soil organic matter content. Such severe burns occurred on only a small portion of their study area. Likewise, Fuller, Shannon, and Burgess (*5*) showed that controlled fires of moderate intensity in the ponderosa pine type in Arizona affected the physical properties of the soil only slightly. Significant physical and chemical effects occurred only where uncontrolled hot fires destroyed the surface layer of unincorporated organic matter. Under these conditions, the effect of heat extended to a depth of 2 or 3 inches in the mineral soil, dehydrating the clay colloids and destroying the structure of the surface layer.

The extensive controlled burning program on the Fort Apache Indian Reservation provided an opportunity for several field studies of the effect of fire on watershed condition. Burning on the Fort Apache is done in late fall, after the first of the winter rains but before the litter is too wet to burn. Fires are ignited along ridgetops and on the crests of hills and buttes, and allowed to burn slowly downhill. Roads, creeks, and natural openings are used as firebreaks, but no effort is made to restrict the burns to small blocks of a few acres each. Under typical conditions the fires spread slowly and evenly, at a rate of 40 to 60 feet per hour. Occasional local hot spots may be severely burned, however, and some areas are missed altogether.

The ponderosa pine forests of the Fort Apache Reservation occupy the higher slopes of the White Mountains, above an elevation of about 6,500 feet. Annual precipitation averages 22 to 28 inches, almost evenly divided between summer rain and winter rain and snow. Distinct spring and fall dry periods separate the two rainy seasons.

The soils of the White Mountains are derived almost wholly from basaltic lava, evidently of Tertiary age. The organic layer of the more mature soils in the ponderosa pine forest is generally a duff mull, possessing some of the characteristics of both mull and mor humus. The surface is covered by a layer of dry litter, beneath which is a fermentation zone of partially decomposed plant material. A layer of amorphous humus is sharply differentiated from mineral soil, but this humus contains varying amounts of soil particles carried upward by insects and other agents. Organic matter is likewise incorporated into the surface two inches of the mineral soil. Underlying the zone of incorporation, but not clearly demarcated from it, is a dark brown, uniform horizon of about 10 inches depth, with a distinct crumb structure. Most of the fine roots of the forest trees are found in this layer, especially near its base. At greater depths there is usually a zone of clay with many large roots.

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Soil Exposure and Erosion

An area of moderately steep topography on Big Diamond Creek, east of Whiteriver, Arizona, was surveyed to estimate the degree of erosion induced by a recent fire. The survey was made on a hillside with a slope of about 35 percent, typical of much of the steeper country in the pine zone. Soils were shallow and rocky, and the vegetation consisted of an almost continuous stand of young ponderosa pine poles. The hillside above the Diamond Creek road was treated with controlled fire in the late fall of 1956; the area below the road was not burned.

The survey was made in August of the following year, after a full season of winter snow and summer rain. A transect of 1,000 paced points was made in the burn and a similar one in the unburned area, far enough from the road to be free of interference from road detritus. At each pace the vegetation or soil condition under a marked point on the left shoe was recorded. Each observed point was classified as to ground cover: bare soil, plant litter, vegetation, rock, or erosion pavement. Degree of erosion was estimated by observation of rock pedestalling and evident soil movement. Erosion classes used were none, slight (less than ¼ inch of soil removed), moderate (¼ to ½ inch), and severe (more than ½ inch soil loss).

Erosion and soil exposure were significantly increased by burning (Table 1). Significance of the change in protective soil cover and in erosion was evaluated by a chi-square test. About 31 percent of the sampled points on the burned area showed some degree of erosion, while noticeable soil movement occurred on only 14 percent of the points on the unburned slope. Bare soil was exposed on 24 percent of the burned points, whereas only about 11 percent of the unburned hillside had no soil protection. Green vegetation was encountered on only about 5 percent of the points on both lines.

On the other hand, no evidence of removal of as much as one inch of soil was found anywhere, and no rills were noted. Many pine seedlings were growing even where erosion was most obvious. These pines germinated in July, indicating that most erosion must have taken place before that time. No uprooted pine seedlings were found, although some may have been completely washed out and lost. A partially healed gully started by an old logging road carries the runoff from a large section of the burned hillside. When observed two hours after a hard rain, this channel was running clear.

Local evidence of minor deposition indicates that much of the material eroded from the hillside is merely moved a short distance down the slope and never reaches a permanent stream. On the whole, accelerated erosion attributable to controlled burning cannot be considered severe even on the steep hillside at Diamond Creek, and it appeared that the soil had essentially stabilized at the time of the survey in mid-August (Fig 1).

The basalt soils of the White Mountains are not particularly subject to erosion. At a somewhat lower elevation in the nearby Gila River drainage, Fletcher and Beutner (*4*) found that soils derived from basalt were much less erodible than adjacent soils derived from sedimentary rocks, even when the two supported closely similar vegetation. In the ponderosa pine zone, erosion is typically much more common on soils derived from sedimentary formations than on lava soils. It is conceivable that accelerated erosion would be more troublesome following controlled burning on the sandy soils of the Coconino Plateau than it is in the White Mountains.

A second paced transect, testing soil exposure only, was made on nearly level land near Blue Mountain, east of the town of McNary. The area included dense thickets of young pine, and small openings in the forest stand. Half had been protected from fire for 30 years or more; the other half had been treated with controlled fire in 1950 and again in the fall of 1956. The slope was too slight to induce measurable erosion.

In the openings, there was no significant increase in the amount of bare soil exposed after burning. On both the burned and the unburned areas, about 30 percent of the paced points fell on bare soil, and another 25 percent on a partial cover of plant litter. These openings, which are common throughout the pine forest, ordinarily accumulate only enough fuel to carry a light and spotty fire. Only about 45 percent of the points in the openings had a well-developed organic layer overlying mineral soil.

By contrast, the forest floor under pine thickets is normally covered by a heavy layer of organic matter. Burning reduced the number of points with a full cover of organic matter from 92 percent to 74 percent. The exposure of bare soil by fire usually resulted from consumption of a thin layer of dry needles that lay directly over mineral soil. Rarely if ever was a well developed duff layer completely consumed and the soil bared by the controlled burns at Blue Mountain.

TABLE 1.—RESULTS OF DIAMOND CREEK EROSION SURVEY

Degree of erosion	Bare soil	Plant litter	Vegetation	Rock	Erosion pavement
None		−	0	+	0
Slight	+	0			+
Moderate	+	+			+
Severe	+				

\+ Significantly higher on burned area.
− Significantly lower on burned area.
0 No significant difference.
No entry: Not recorded on either.

Organic Matter

The effect of controlled fire on light, flammable litter has been discussed by Gaines, Kallander, and Wagner (*6*). As might be anticipated, the quantity of litter on the forest floor is greatly reduced by burning, but soon builds up to a point equal to that before the fire. No studies have been made, however, of the effects of

fire on the quantity of partially decomposed organic matter that overlies the soil, or of the effect of fire on the water-holding capacity and other hydrologic characteristics of the organic layer.

A limited sampling of the litter (L), fermentation (F), and humus (H) layers of the soil was carried out near Blue Mountain. The weight of the organic matter on the forest floor was estimated by collecting all material above mineral soil within a wire sampling frame 9.6 square feet in area. The weight in grams of the material removed from a plot of this size, multiplied by 10, gives an estimate of the weight of the organic layer in pounds per acre. Eleven such samples were taken in an unburned area and 20 in an adjacent tract treated with controlled fire the previous fall. Each set of samples was equally divided between 38-year-old pine thickets and a mature stand. Because of the difficulty in distinguishing between them precisely, the F and H layers were combined for analysis. The combined layers will be collectively referred to as humus.

The mature stand laid down about 9,610 pounds of dry leaf and branch litter per acre, while the accumulation beneath the pine thickets was about 7,250 pounds per acre. A t-test showed that this difference is statistically significant. Essentially all the dry surface litter was consumed by fire on each of the burned plots.

Differences in weight of the humus layer before and after burning were studied through an analysis of variance. There was significantly more humus beneath the mature stand than under the thickets. The weight of decomposed organic matter on the forest floor was significantly decreased by burning in both types of stands, from an average of 61,000 pounds per acre before burning to 51,750 pounds after. The interaction of age and treatment was not significant, indicating that fire is essentially similar in its effects on the humus layer of both types of stands.

Burning produces evident changes in the physical condition of the decomposed organic matter. Humus that has not been exposed to fire has an open, felty texture due to quantities of fungus mycelium. The organic layer beneath a burned surface is more compact, darker in color, and with a distinctly fine-grained texture. It seemed possible that changes in the water-holding capacity of the humus might accompany changes in its appearance following fire.

The water-holding capacity of 15 humus samples from burned sites and 5 from unburned sites was analyzed with a porous plate and a pressure membrane apparatus. The water retention of small disturbed samples from each of the 20 soils was determined after exposure to pressures of ⅓ atmosphere, 1 atmosphere, and 15 atmospheres. Most of the variation in water-holding capacity among samples seemed to be associated with differences in quantity of mineral matter incorporated into the humus. Each sample was therefore ignited in a furnace at 700° C., and the loss on ignition calculated. Water retention of each sample was plotted as a function of loss on ignition (Fig. 2).

At none of the three pressures to which the samples were subjected was there any apparent difference in the regression lines applicable to burned and to unburned soils. To test possible differences, regression equations were calculated in the form

$$Y = a + b_1 (x_1 + x_2) + b_2 (x_1 - x_2)$$

in which Y is percent moisture retention, a is a constant, x_1 is percent loss on ignition of the burned humus, and x_2 is percent loss on ignition of the unburned humus. If the regression coefficient b_2 proves significant, a common regression equation is not applicable to the burned and unburned samples. Separate regressions in this form were fitted to data from humus subjected to each of the test pressures. In none of the three equations was the regression coefficient b_2 statistically significant. There appears to be no important difference in relative moisture holding ability of the humus layers in burned and unburned soils, so long as they are similar in content of incorporated mineral matter.

FIG. 1.—Soil conditions on a steep hillside above Diamond Creek the year following a light fire.

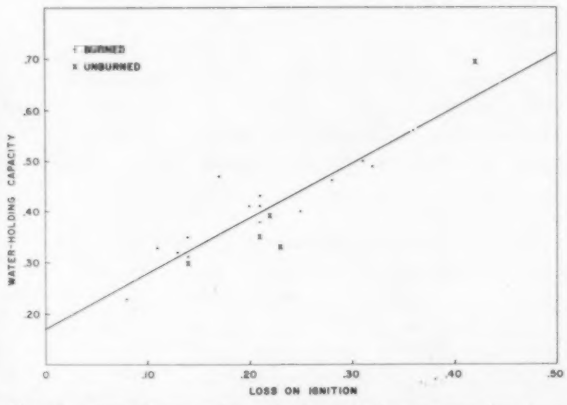

FIG. 2.—Percentage water retention of humus samples at 1 atmosphere moisture tension. Water-holding capacity is dependent on the amount of organic matter in the humus, as measured by percent loss on ignition.

Water retention at ⅓ atmosphere pressure approximates that of the soil at field capacity. Based on 20 samples, average water retention at ⅓ atmosphere was 46 percent of the dry weight of the humus.

Vegetation and Water Use

There is little doubt that there is now more total vegetation on the watershed in the ponderosa pine zone than there was at the beginning of this century. Frequent natural fires formerly removed large quantities of flammable material at regular intervals. The increase in vegetation density following the restriction of fires gave the initial impetus to controlled burning on the Fort Apache Reservation (*8*).

Whatever the effects of the increased density of young pine stands on wildfire hazard and tree growth, there is no conclusive evidence as to its influence on watershed condition or water yield. Average annual flow of the Salt River has clearly declined in recent years compared to the early part of the century. Many opinions have been expressed that the lessened streamflow is primarily attributable to increased interception and transpiration by a greater volume of vegetation on the watershed. In a careful statistical study of precipitation-streamflow relations on the Salt River, Anderson (*1*) found no clear evidence of such an effect. He concluded that the decline in streamflow could largely be explained by the deficiency of precipitation in recent years.

The controlled burns on the Fort Apache remove live lower branches from pole sized trees, and usually kill outright small suppressed trees. There is relatively little actual thinning of pole stands, however, except where a small opening is created around a fiercely burning stump or other local hot spot. Usually these openings are of such size that the vacant space is quickly appropriated by the roots of the remaining trees. It is doubtful if controlled burns of the intensity now being practiced on the Fort Apache Reservation will reduce the quantity of transpiring vegetation enough to affect streamflow materially. The additional soil moisture made available will probably be utilized almost completely by the plants that remain.

Discussion

Bare soil, exposed to the beating of raindrops, is subject to erosion. Even a light protective cover of organic matter will absorb much of the energy of falling raindrops and will retard soil movement. This same protective layer maintains high infiltration rates in the surface soil. In a ponderosa pine stand in California, Rowe (*7*) found that infiltration rates were low and rates of surface runoff correspondingly high on plots with bare mineral soil. Where a protective humus layer was present, infiltration was rapid and little or no runoff took place. A humus depth of ½ inch was as effective in preventing surface flow as were deeper accumulations.

In the ponderosa pine forests of the White Mountains, a humus layer one to three inches deep is commonly developed under a closed tree canopy. Bare soil is usually exposed only on animal burrows and similar disturbances. In openings or under a sparse tree cover, humus accumulation is usually thin and spotty, and is often concentrated in depressions. Controlled fires normally consume most of the dry surface litter. Where this dry litter is the only soil protection, bare soil is exposed following burning. Even when present, dry litter is a much less effective protection than firmer humus. Controlled fires almost never remove all of the humus.

Delay in delivery of water to streams due to temporary detention storage by forest humus is important in areas subject to flooding after heavy rains. This factor is not of major consequence on the watersheds of Arizona, however, for there is little human habitation or property subject to flood damage in the steep river canyons above the large storage dams. The storage reservoirs are adequate to absorb any but the largest floods.

Retention storage may be more significant. Undisturbed organic matter on the forest floor can retain as much as 0.3 inch of moisture. This is subject to evaporation, and must be replaced by the next rain before moisture can penetrate the soil. On the other hand, Rowe's lysimeter study (*7*) showed that humus retards evaporation from the underlying soil. Total seasonal evaporation from bare soil exceeded that from soil with an organic cover. Rowe's evaporation plots were in openings rather than under a tree canopy. More studies are needed of the hydrologic effect of the humus layer under Arizona conditions. Present knowledge indicates that a relatively thin layer of firm humus is desirable to prevent soil movement and perhaps to retard evaporation from the underlying soil. Removal of surplus litter, branches, logs, and some humus may have slight beneficial effects on water yields.

Much more needs to be known about the quantitative use of water by forest stands of different densities and at different seasons. More needs to be known about evaporation from the forest floor under different degrees of humus accumulation. Finally, more needs to be known about the effects of controlled fire on these aspects of watershed condition.

On the basis of the information presently available, it can be concluded that the influence on watershed condition of controlled burning as currently being carried out on the Fort Apache Indian Reservation is relatively slight. Little additional soil erosion follows burning. The reduction in quantity of dead organic matter on the forest floor and in volume of transpiring vegetation may make small additional amounts of water available for stream flow.

Summary

The effects of controlled burning on watershed condition in the ponderosa pine zone were studied on the Fort Apache Indian Reservation in Arizona. Soil exposure and soil movement were significantly increased by burning, but there was no evidence of removal of as much as one inch of soil. Most eroded material merely moved a

short distance down slope, and the soil was essentially stabilized nine months after burning.

Burning reduced humus accumulation beneath pine stands from about 61,000 pounds per acre to 52,000 pounds. The physical appearance of the remaining humus was altered by fire. There was no significant difference in water-holding capacity of burned and unburned humus.

Although vegetation density on the watershed has increased due to restriction of natural fires, it is doubtful if controlled burning of the intensity now being practiced will reduce the total quantity of vegetation enough to affect streamflow materially. The over-all influence on watershed condition of controlled burning as currently being carried out on the Fort Apache Reservation is relatively slight.

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Forestry in Soviet is Subject of New USDA Booklet

Forestry practice in the Soviet Union was examined by a seven-man study tour of foresters from the United States in the summer of 1959 and their findings have been published by the U. S. Department of Agriculture in a 90-page report entitled *Forestry and Forest Industry in the U.S.S.R.*

The forestry team from the United States traveled some 6,000 miles and talked to dozens of Soviet foresters and officials in a 30-day, on-the-ground study of the problems, procedures, and progress of Soviet forestry.

Members of the U. S. forestry delegation included professional foresters and representatives of the forest industry and of schools of forestry. Dr. George M. Jemison, deputy assistant chief of the U. S. Forest Service, acted as leader of the delegation.

The trip began and ended in Moscow, where the group visited agricultural exhibits and bureaus. They saw logging operations at Krestzy; research institutes, experimental forests, and mills in and around Leningrad; then journeyed through Karelia, the Ukraine, Crimea, and Georgia to Stalingrad where they examined shelterbelt operations before returning to Moscow to start the homeward flight.

Forest land in the U.S.S.R. comprises about 28 percent of the forest land of the entire world. Productive Soviet forest lands cover about 2,066 million acres, compared to 529 million acres of commercial forest land in the United States. Total growing stock on U.S.S.R. forests was reported by the study group to be 2,812 billion cubic feet, with softwoods comprising 86 percent of the timber.

Timber growing in the Soviet Union, the booklet points out, is predicated on a basic biological philosophy completely unlike that in the United States.

One part of this philosophy, popularly identified with the principal current exponent, T. D. Lysenko (head of the Chair of Agronomy at the Timeryazev Academy in Moscow), is based on the idea that acquired characteristics of plant life can be inherited. In practice they work on the theory that the way to develop new forms of plant life is to "de-stabilize" the heredity of the plant and utilize desired characteristics that happen to appear.

The U. S. delegation received one other strong impression of basic variance between forestry in the United States and the U.S.S.R. In the Soviet they found a tendency toward exploitation, rather than management, of the forests. This was attributed by the U. S. foresters to an administrative system under which the responsibility for tending, regenerating, and protecting the forests rested with one agency, while the responsibility for logging was under a completely different bureau. A change in the responsibility for forest management has been introduced since 1959, the booklet states, apparently in an effort to lessen exploitation.

Forestry education in the Soviet Union was of particular interest to the study group. Visits were made to two technical forestry institutes and two forestry faculties in agricultural academies, and supplementary information was gathered at a number of research institutions. There were 11 technical forestry schools in the U.S.S.R. at the time of the study. Entrance requirements are exacting, and the number of students is regulated by current forest industry needs.

Consensus of the visiting study group after its 30-day tour was that the Soviet foresters for the most part comprise a dedicated, hardworking, and sincere professional group. "They are friendly," the booklet states, "and desirous of strengthening professional ties with foresters in the United States."

Forestry and Forest Industry in the U.S.S.R. may be purchased for 55 cents from the Superintendent of Documents, Washington 25, D. C.

Family Income and Wood Consumption[1]

Joseph Zaremba

A REASONABLY valid forecast of our national wood needs must be based upon a true evaluation of the factors that influence wood consumption. What these factors are and how much each one affects consumption will vary from time to time and also with the various uses to which wood is put. Generally speaking we may distinguish between price and the nonprice factors. In an analysis of lumber demand, the principal nonprice factors are population, consumer preference, and consumer income. And if price is not the price of wood in place, then the cost of using wood should be included among the nonprice factors.

The long-run trend of lumber prices in the United States, both in relation to prices of competing materials and to all-commodity prices, has been upward. Lumber prices today are about three times their 1926 level, while the prices of competing materials are only 60 percent higher.[2] Lumber price behavior has thus tended to curtail lumber consumption. And unless the industry raises its productivity at a faster rate than competitive industries, this retarding influence will continue into the future.[3]

THE AUTHOR is on the staff of the State University College of Forestry at Syracuse University, N. Y.

[1]This article is based on the author's doctoral dissertation, "Some problems in forecasting future wood requirements." Harvard University. 1958.

[2]U. S. Department of Labor, Bureau of Labor Statistics. Monthly Labor Review.

[3]A recent study by the National Bureau of Economic Research (Fabricant, S. Basic facts on productivity change. Occasional Paper 63. 1958) reveals that during the 54-year period, 1899 to 1953, productivity in the entire lumber and wood products group increased about 75 percent. This group includes logging camps, sawmills, planing mills, veneer mills, lath mills, shingle mills, cooperage-stock mills, plywood mills and other establishments engaged in manufacturing finished articles made entirely or mainly of wood. While this increase in productivity might be regarded as tangible evidence of progress, it should be observed that lumber and wood products was second lowest of 33 major industrial groups studied, anthracite mining being lowest with a productivity increase of about 60 percent. By way of contrast, the increase in productivity in the stone, clay, and glass manufacturing group was 330 percent; and for primary metals it was 250 percent. Productivity in the lumber and wood products group is thus lagging far behind that in competitive industries. Productivity in the lumber industry alone is probably lagging even more than that for the entire group.

Population trends have had the opposite effect upon the consumption of lumber and other wood products. Expanding populations require numerous items to feed, clothe, and house additional inhabitants. With 55,000 people being added to the American population each week, two new dwelling units are required each minute just to provide shelter. The population of the United States is expected to double by the end of the century, a period shorter than the sawtimber rotation for most species.[4] A rising population has been the principal cause of a progressive enlargement of lumber demand over the years.

The influence of consumer tastes and preferences (or attitudes) cannot be predicted with a reasonable degree of certainty. One difficulty is that preference (unlike price, population, and income) cannot be measured numerically. Changes in consumption which are brought about by changes in preference are often believed to be caused by other factors, such as price. But the consumer's attitude is often the dominant factor underlying his choice of materials.

Some satisfaction may be derived from the fact that consumers' attitudes can be influenced by product improvement and advertising. The wood promotion program by the National Lumbermen's Manufacturers Association is evidence of the fact that wood-using industries are beginning to recognize the importance of establishing and maintaining a favorable consumer attitude toward wood products.

In this article the influence of the remaining nonprice factor—consumer income—is examined. An income demand function for wood in house construction is derived. Then the validity of using income demand for estimating wood requirements is examined. Finally, it is suggested that rising consumer income in the American economy could exert, within the next few decades, a strong upward pressure on wood demand in construction.

Relationship Between Family Income and Wood Consumption

A method known as cross-section analysis is often used successfully to determine the relationship between family income and consumption. The quantities of the commodity in question consumed by families with different incomes are obtained. These quantities are plotted against family income, and a curve drawn through the points represents demand as a function of income.

Figure 1 depicts the income demand for all wood (including plywood, trim, and window frames) used in building single-family

[4]The population of United States increased 20 percent from 1950 to 1960, or from 151 to 180 million. The population is expected to increase at about this percentage in the decades ahead. The Department of Commirece gives four estimates for 1970 which range from 203 to 219 million, and for 1980 the estimates range from 231 to 272 million (Statistical abstract of the United States 1959, p. 6). The New York Times in a review of the nation's economic trends (Monday, Jan. 11, 1960, p. 47) comments on the future population as follows: "The projection for 1970 is from 204 to 217 million. And in 2000? At least 360 million."

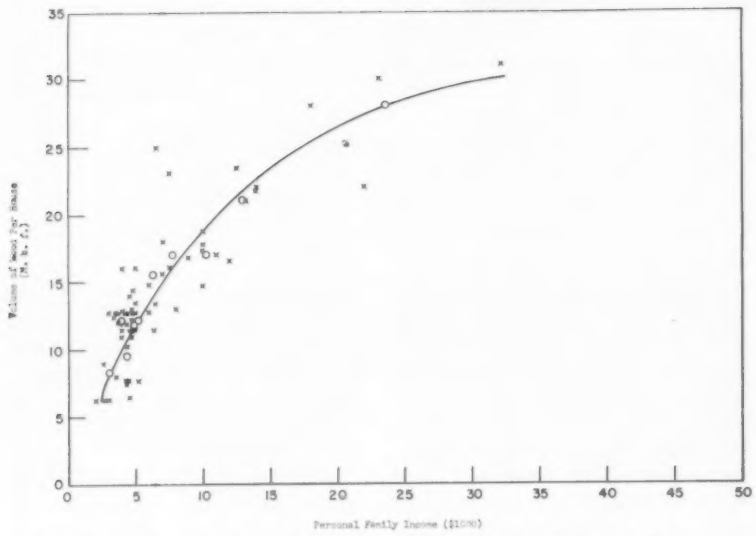


FIG. 1.—Income demand for wood in single-family houses. New Haven, Conn., 1954.

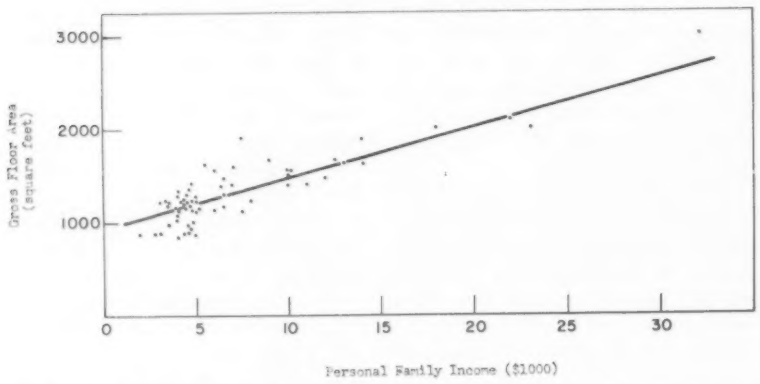


FIG. 2.—Gross floor area of single-family houses as a function of family income. New Haven, Conn., 1954.

houses during 1954 in the New Haven metropolitan area. Sixty-three families were selected randomly from a total population of 1,200 families who had purchased new houses or built their own houses during the year. Each family is represented by a point; the horizontal scale gives the personal income of the family and the vertical scale the total volume of wood in the house. The curve is drawn through averages represented by small circles.

The income demand in Figure 1 shows how wood consumption varies with the income of an average New Haven family contemplating the purchase of a house. The use of cross-section analysis serves to hold constant all other factors (mainly preference and price) that influence wood consumption.[5] This curve is, therefore, a true relationship between famly income and wood consumption.

The upward response of wood consumption to family income is due primarily to three factors. First, increasing incomes permit families to satisfy their desires for larger houses. And wood consumption varies, within the probable range in house size, directly with house size.[6] The relationship between family income and house size in New Haven is shown in Figure 2. Second, there is greater use of interior wood paneling in the medium- to high-priced houses than in the lower-priced houses. Today it is not uncommon to find wood paneling used throughout the dwellings of high-income families. Finally, as incomes increase consumers often choose the one-story ranch which requires more wood per square foot of floor area than do one and one-half or two-story houses.

Oddly enough, there is no relationship between family income and family size, or between house size and family size. In the New Haven sample as many people live in small houses as in large houses. Family size does not explain the shape of the income demand in Figure 1.

Stability of Income Demand

The response of wood consumption to family income is very high, as indicated by the steepness of the curve in Figure 1. With average family income in the United States expected to double (in terms of present purchasing power) within the next two or three decades, it is useful to know if wood consumption will increase as indicated by this relationship. Can we, in other words, forecast wood consumption in residential construction by means of family income?

The answer depends on whether the income demand is stable over time. If it remains stable during the period in question, we are justified in using family income to forecast wood requirements per dwelling unit.

To test the stability of income demand, a similar function was derived by the writer for 1940. A random sample of 38 families who had purchased or built new houses during 1940 in New Haven was selected and the family incomes and wood volumes obtained. The 1940 income demand is depicted in Figure 3[7]; and the 1940 and 1954 income demands are compared in Figure 4.

Apparently the income demand in New Haven was relatively

[5] Wold, H., and L. Jureen. Demand analysis, Chapter 1. John Wiley & Sons, New York. 1953.

[6] Vaux, H. An economic-statistical analysis of lumber requirements for California housing. Hilgardia 19:463-500. March, 1950.

[7] The 1940 family incomes were increased by 83 percent to make them comparable in terms of purchasing power to 1954 family incomes. This percentage was derived from all-commodity price indexes.

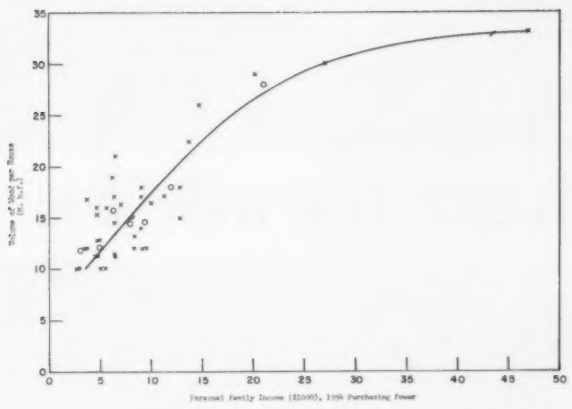


FIG. 3.—Income demand for wood in single-family houses. New Haven, Conn., 1940.

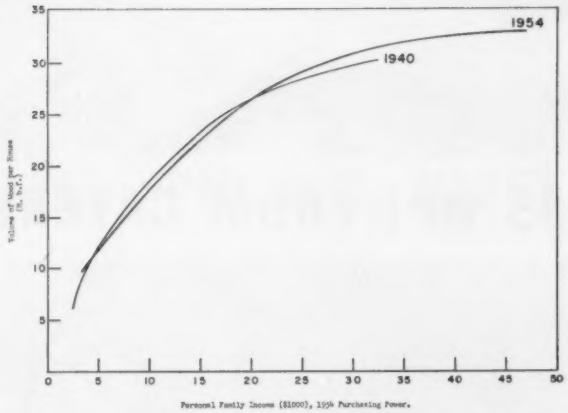


FIG. 4.—1940 and 1954 income demands. New Haven, Conn.

stable during the 15-year period, 1940-1954. This fact may be surprising in view of the far-reaching developments in building technology and construction materials that took place during this period. Yet it should be noted that there was no large-scale displacement of wood during this period; trends in house design tended, if anything, to increase wood consumption. Thus it would seem that if wood can hold its own in house foundations and house exteriors, we can be reasonably confident that the income demand in New Haven will remain quite stable in the years immediately ahead.

Since the income demand was stable in the period 1940-1945, the 1940 demand curve could have been used to predict 1954 consumption from a forecast of average family income. The income in question, of course, is the average income of home buyers, not of all families. The average income of home buyers, based upon the families included in the samples, declined from 9.3 to 7.3 thousand (1954 purchasing power) from 1940 to 1954. At the same time, the average volume of wood declined from 15.8 to 14.5 M board feet as the 1940 curve says it should.

It is interesting to note that the average income of home buyers declined at a time when the average income of all families increased. If indeed our samples are truly representative of 1940 and 1954 conditions, then it must be concluded that a rising proportion of low income families in New Haven have taken up ownership of single-family houses. This is, of course, a reasonable assumption and it points up the need for caution in selecting an income forecast for which to predict consumption. However, it should be recognized that in the future the average income of home-purchasing families will not decline indefinitely in the face of rising incomes generally. There is some evidence that the trend in incomes of these families has already been reversed.

Income Demand for United States

The New Haven income demand offers a clue to the nature of the income demand for wood in residential construction for the entire country. Such an income demand will slope upward rather steeply in the medium income range because, with certain exceptions, home buyers everywhere will react about the same to income changes. It is true that in some localities families switch from wood to masonry exteriors as their incomes increase, but the decrease in wood consumption resulting from this switch is more than offset by the increase in wood consumption from larger ranch-style houses with interior paneling. Also, in some localities families switch from nonwood exteriors (concrete block and asbestos shingles) to wood-shingle and wood-siding exteriors. Even so, the income demand in the nation may not be quite so steep as that depicted in Figure 1.

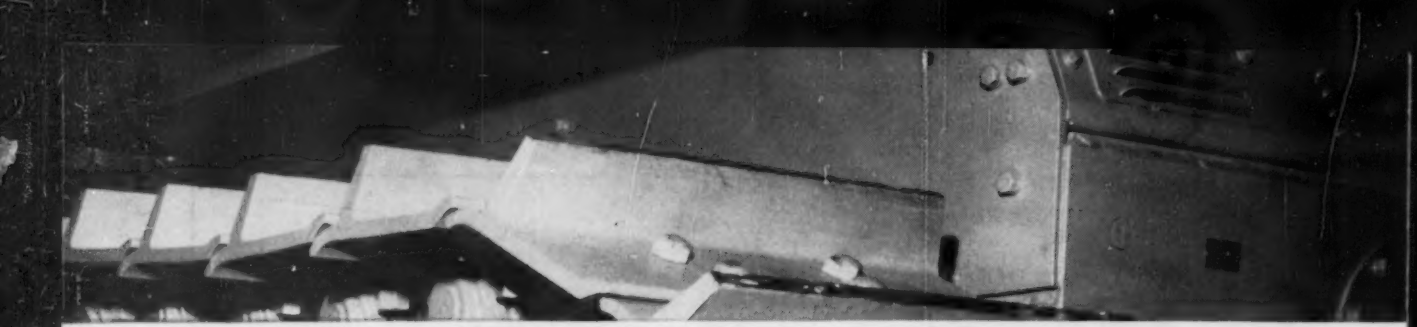
There is some evidence to support the argument that the nation's income demand closely approximates the New Haven income demand. The United States average family personal income during 1954 was about $5,500. Reading opposite this income in Figure 1 gives an average volume of 12 M board feet. According to the Stanford Research Institute, the national average volume per dwelling unit in 1953 was slightly less than 12 M board feet (Table 1). Thus the nationwide income demand, representing both homeowners and renters all over the United States, and the New Haven income demand almost coincide, at least in the vicinity of $5,500.

Estimating by Means of Family Income: Comparison with Recent Forecasts

However, the point on which this analysis rests is not that the national income demand coincides with that of New Haven, but rather that the two probably have the same general configuration. On this premise, we may draw some conclusions that are highly significant qualitatively. In what follows, the quantities that apply to New Haven are used merely for illustration.

Family income is expected to double from 1954 to 1975-1980, an increase from about $5,500 to $11,000 in 1954 purchasing power. As Figure 1 shows, a family with a personal income of $11,000 will tend to purchase a dwelling unit averaging 19 M board feet. This

(*Continued on page* 448)



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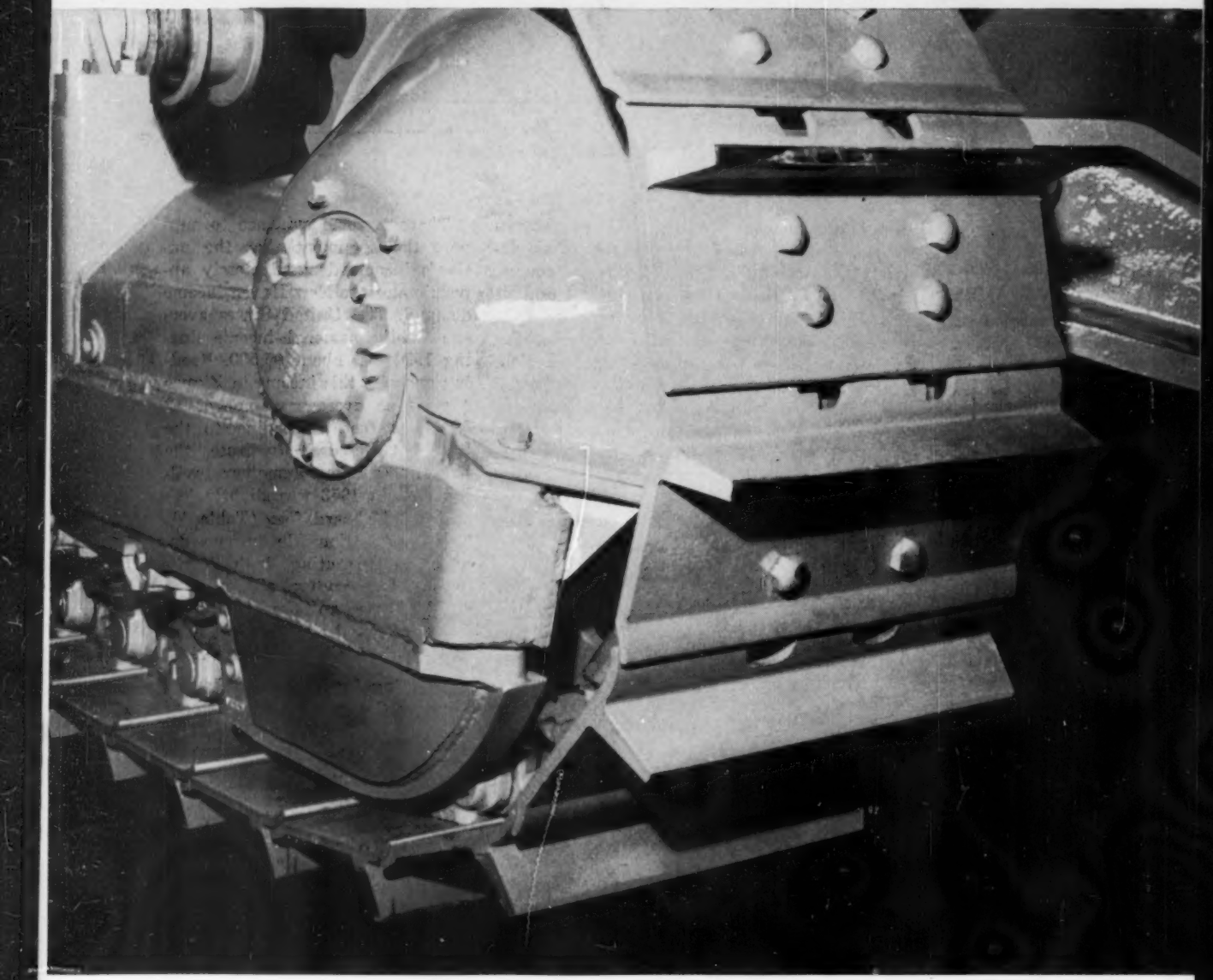

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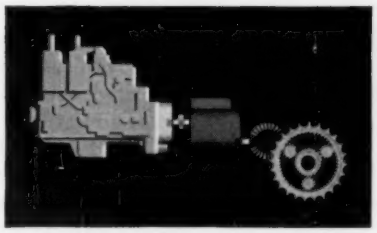

CAT D353 ENGINE AND MATCHED POWER TRAIN This engine, rated 385 HP (flywheel) at 1330 RPM, has been proven—and proven again—over thousands of hours on the roughest jobs. Its 6.25″ x 8″ six-cylinder design now incorporates *controlled turbocharging* and aftercooling (found only in the D9G among crawler tractors), assures more efficient use of fuel, increases maximum torque and provides fast engine response over a wide range of operation. Shroud-mounted fan reduces air recirculation; torque limiting clutch saves on fan horsepower. Plus: exclusive Caterpillar fuel injection system, twin dry-type air cleaners, oil-jet-cooled pistons, "Hi-Electro" hardened cylinder liners and crankshaft journals.

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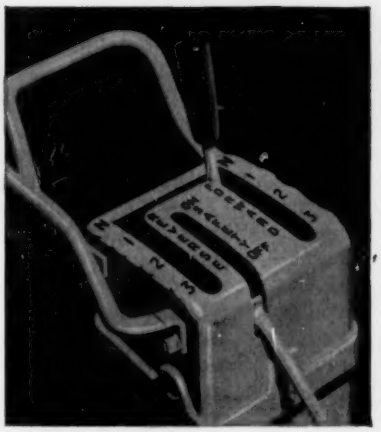

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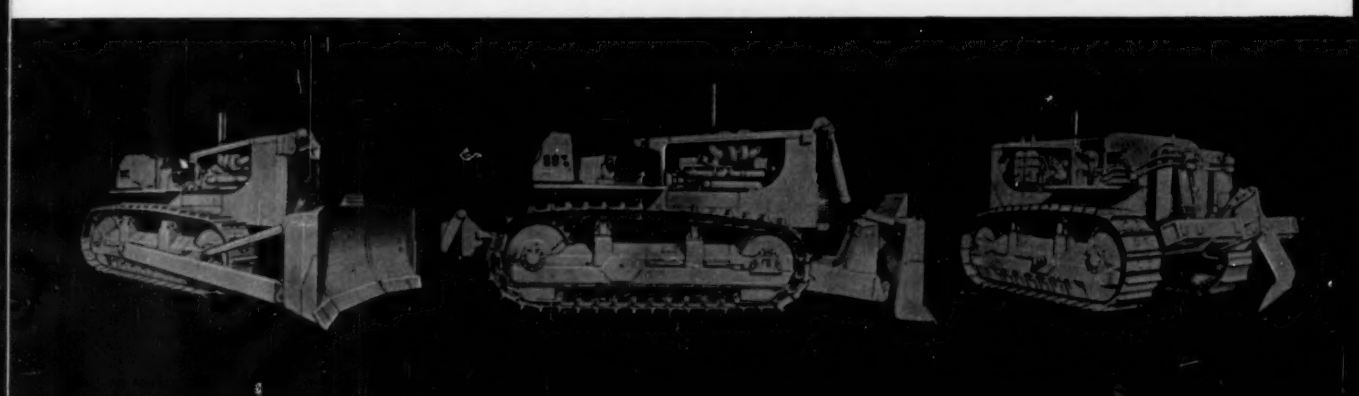

TABLE 1.—COMPARISON OF FORECASTS OF WOOD REQUIREMENTS PER DWELLING UNIT

Year	Income demand (Figure 1)	Stanford Research Institute[1]	U. S. Forest Service[2]
1954	12M	11.2 M { 10.5 M lumber, 0.7 M plywood }	11.13 M { 10.0 M lumber, 1.13 M other wood }
1975-1980	19M	9.9 M { 8.7 M lumber, 1.2 M plywood }	11.0 M { 9.0 M lumber, 2.0 M other wood }

[1]Stanford Research Institute. America's demand for wood. 1954. pp. 197 and 367.
[2]U. S. Forest Service. Timber resources for America's future. Forest Service Report No. 14. 1958. p. 383.

estimate is compared in Table 1 with recent forecasts by the Stanford Research Institute and the U. S. Forest Service.

Even if a liberal adjustment is applied to the estimate from Figure 1 to allow for any lack of comparability between the national income demand and the New Haven income demand, it would still be much higher than the other two forecasts. The principal reason for this difference lies in the treatment of the influence of family income. Both the Forest Service and the Stanford Research Institute disregarded the possible effects of rising family income upon wood requirements in construction. Specifically, they failed to consider the effect of rising family income upon dwelling unit size, the principal determinant of wood requirements. Their forecasts for 1975 are based on the assumption that average dwelling unit size well remain steady at about 1,000 square feet. There is reason to doubt the validity of this assumption.

Average size of all newly built dwelling units declined from 1,310 square feet in 1920 to about 1,000 square feet in 1950. The long-time decline in family size has probably been one of the factors contributing to this decline. It is true that the New Haven findings show no relationship between house size and family size at a given point in time. Over time, however, changes in family size can be expected to alter tastes and preferences and, in this way, influence the trend of dwelling-unit size. Also, the shift from two-story and one and one-half-story houses to the more costly ranch style may have been accomplished at the expense of house size. Then, too, there is evidence that a general downward shift in consumer preference for housing took place from 1910 to 1950, and an upward shift in preference for other major items such as automobiles and recreation.[8] These phenomena together with the steady displacement of wood by substitute materials suggest, at least, that the income demand representing home buyers and renters for the country as a whole has shifted downward during the two or three decades prior to 1950. This downward shift has been more than sufficient to counteract the tendency for family income to increase dwelling unit size and wood consumption. In other words, the influences of the nonincome factors such as consumer preference, family size, and price outweighed the influence of income during this period.

Since the early 1950's, however, the trend of average house size has been upward. According to the Bureau of Labor Statistics, the average size of single-family houses built during 1954, 1955, and 1956 was, respectively, 1,140, 1,170, and 1,230 square feet.[9] Builders and others connected with the building trade have repeatedly stressed the fact that in recent years larger houses and apartments have been built because consumers have had more money to spend. These data, although admittedly very sketchy and inconclusive, suggest that the national income demand for wood in residential construction may have reached a point of stability, and that family income at last is emerging as a relatively important factor underlying lumber consumption trends.

[8]Winnick, L. Housing: has there been a downward shift in consumers' preferences? The Quarterly Journal of Economics LXIX:85-99. 1955.
[9]Single-family houses accounted for about 90 percent of all dwelling units built during this period.

Conclusions

The estimate of wood volume per dwelling unit obtained from Figure 1 is not intended to be a forecast of wood requirements in the same sense as the forecasts made by the Forest Service and the Stanford Research Institute. The possibility of shifts in income demand must be explored before any estimate can be taken seriously. It is also desirable to know more about the income demand for the entire country. But apart from the significance that is attached to this estimate, there is probably fairly close agreement on two points: (1) the real purchasing power of the average American family is rising, in the long run, at a faster and faster rate; and (2) the average American family with an income of $11,000, 15 to 20 years hence, will probably regard a house of 1,000 square feet much too small to meet its basic needs.

Rather than offer a technique for precise forecasting, the purpose of this analysis is to focus attention on the possible emergence of a strong influence governing lumber consumption, that is, rising family income. It is worthwhile for the industry to consider how to take maximum advantage of the opportunities which rising income may offer in the future.

Family income could exert a strong upward pressure on wood demand in construction provided certain conditions are favorable. These are: that the industry is successful in regaining the lumber siding market; that the trend toward the slab foundation is halted and the trend toward the crawl space type is speeded up; and that the proportion of single-family houses to all dwelling units remains at a high level.

Notes and Observations

Effects of Lifting Date, Cold Storage, and Grading on Survival of Some Coniferous Nursery Stock[1]

The best time to lift nursery stock and the subsequent effect of holding stock in cold storage are particularly important in the Rocky Mountains because of differences in altitude. Trees in the low altitude nurseries begin to grow before snow leaves the high altitude planting sites. A study to test the effect of lifting date, cold storage, and grading on the survival of nursery-grown Engelmann spruce (*Picea engelmannii* Parry), lodgepole pine (*Pinus contorta* Dougl.) and ponderosa pine (*Pinus ponderosa* Laws.) was made in Colorado in 1958.

Planting stock was obtained from the U. S. Forest Service Nursery at Monument, Colorado. The following stock was lifted on April 6, April 13, April 20, April 27, May 4, and May 11:

Species	Age	Number
Engelmann spruce	3-0	120
Lodgepole pine	2-0	120
Ponderosa pine	2-1	80

Forty of each species were planted at the Colorado State Forest Nursery at Fort Collins (elevation 5,200 feet) a day after they were lifted. The remaining trees were placed in cold storage. On June 14, 40 of each species that had been placed in cold storage each lifting date were planted in the nursery. The remaining 40 spruce and lodgepine were planted June 29 at Coffee Pot Mesa on the White River National Forest (elevation 10,400 feet).

Each group of 40 seedlings was graded into 2 lots; 20 above and 20 below average in size and apparent vigor which were planted separately.

Survival counts commenced two weeks after the first planting and were continued at two-week intervals until June 15. Monthly counts were then made from July 1 until October 1.

Weather immediately after planting influenced survival on at least one occasion. Stock planted during the week of April 13 suffered noticeably as a result of strong, dry winds that prevailed for several days following planting. Stock lifted the same week but stored and planted later when weather conditions were more favorable survived better.

There were no differences in over-all survival of any species that could be attributed to cold storage. Eighty-five percent of the unstored and 83 percent of the stored lodgepole pine survived; 85 percent of the spruce and 94 percent of the ponderosa pine survived in both cases (Table 1).

Above-average grades of stock survived significantly better than below-average grades for all species. Survival was 89 and 80 percent for the two grades of Engelmann spruce, 75 and 69 percent for lodgepole pine, and 98 and 90 percent for ponderosa pine.

The influence of lifting date on survival was modified by other factors including storage, species, and inception of top growth. Survival of lodgepole pine was significantly different between lifting dates but the survival of spruce and ponderosa pine was about the same from one lifting date to another.

Bud swelling (marking inception of top growth) of lodgepole pine began between the second and third lifting dates but survival of stored stock continued good until the sixth lifting date, when it

TABLE 1.—SEEDLINGS SURVIVING BY LIFTING DATE AND TREATMENT

Treatment	Lifting date 4-6	4-13[1]	4-20	4-27[2]	5-4	5-11	Total
	Percent						
	Engelmann spruce						
No storage Nursery planted	78	75	88	90	90	88	85
Stored Nursery planted	80	85	85	95	90	78	85
Stored Mesa planted	80	85	95	92	88	65	84
All treatments	79	82	89	92	89	77	85
	Lodgepole pine						
No storage Nursery planted	82	70	98	82	95	85	85
Stored Nursery planted	88	100	88	90	95	40	83
Stored Mesa planted	65	62	48	48	40	20	47
All treatments	78	78	78	73	77	48	72
	Ponderosa pine						
No storage Nursery planted	98	88	92	92	95	98	94
Stored Nursery planted	95	95	88	100	90	98	94
All treatments	96	91	89	96	92	98	94

[1]Bud swelling of lodgepole pine began on April 15.
[2]Bud swelling of Engelmann spruce began on April 27.

[1]The study was conducted while the author was forestry aid, Rocky Mountain Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric.

Results of the study have been used in a thesis as partial requirements for a Master of Science degree in forest management at Colorado State University. Appreciation is expressed to the Colorado Forest Service for providing cold storage facilities and planting beds at their nursery near Fort Collins.

dropped to less than one-half of what it had been earlier. Survival of unstored stock continued good through the sixth week (Table 1).

Lodgepole pine survived more poorly on Coffee Pot Mesa than in the nursery. That may have been due to seed source or weather. Plantings at high elevations have been more successful in other years.

Survival of Engelmann spruce improved gradually for each of the first four lifting dates. After bud swelling began, survival declined slightly but the only material reduction was found in the survival of stock lifted in the sixth week (10 days after first bud swelling was noticed) and planted on Coffee Pot (Table 1).

Trees that are in a growing condition are considered to have an impaired capacity to survive transplanting. Inception of top growth in this study was marked by the swelling of buds. The pattern of survival of the trees used in this study for one to four weeks after first bud swelling suggests capacity to survive was not impaired greatly by conditions marked by first bud swelling, but became increasingly impaired as growth progressed. It appears that we have considerable latitude in lifting dates and subsequent treatment of stock that is to be planted promptly in a situation favorable for survival. But that latitude is narrower for stock that is to be stored and planted in situations less favorable for survival.

Summary and Conclusions

The effect of lifting date, cold storage, and grading on survival of Engelmann spruce, lodgepole pine, and ponderosa pine nursery stock was tested.

The above-average grade stock of all three species survived significantly better than below-average stock.

Cold storage did not significantly reduce over-all survival of any species, and survival by lifting dates differed significantly only for lodgepole pine. There was evidence, however, that lifting spruce two weeks and lodgepole pine four weeks after the beginning of bud swelling impaired the capacity of the seedlings to survive. The degree to which impairment influenced subsequent survival was influenced by treatment. Seedlings planted in unwatered nursery beds the day after lifting survived equally well for all lifting dates. Seedlings of spruce and lodgepole pine lifted two and four weeks after first bud swelling and stored for five to seven weeks did not survive so well.

CHARLES L. SIMON

Assistant ranger, Gunnison National Forest, Colo.

FAO Mexican Conifer Tour

Thirty-three foresters from 23 countries participated in the FAO Seminar and Study Tour on Latin American Conifers in Mexico from September 20 to October 28, 1960. This tour following the Fifth World Forestry Congress was sponsored by the Mexican Government and the Food and Agriculture Organization (FAO) of the United Nations. Afterwards, some members of the group made additional short trips to study the pines in British Honduras and Cuba.

Co-directors were Dr. A. Y. Goor, FAO forester from Jerusalem, Israel, and Ing. Roberto Villaseñor A., Director, Instituto Nacional de Investigaciones Forestales, Progreso 5, Coyoacán 21, Mexico City, D. F. Mexico. Eight foresters came from South America, 7 from Africa, and smaller numbers from other regions. I was pleased to be the representative from the United States.

Mexico has more different species of pines (genus *Pinus*), the world's most important timbers, than any other equal area in the world, about 35 to 40 species. Also native are smaller numbers of 9 other genera of conifers. During the past half century, the subtropical Mexican pines have been introduced into other regions, for example, southern Africa.

Foresters growing plantations in these other countries have awaited this opportunity to see these Mexican pines in their native home for selecting the best species for particular localities and for arranging to obtain seed of improved quality. Objectives of the seminar and study tour included discussions on the value of these conifers, their worldwide possibilities and better use, and means of establishing international cooperation for exchanging materials, seeds, bibliography, and experiences.

Nearly five weeks were spent on the tour, which was arranged by the Subsecretariat of Forest and Wildlife Resources, of the Department of Agriculture and Livestock, with the cooperation of local foresters. The group traveled about 6,000 miles through the country, mostly by chartered bus supplemented by station wagon and airplane. Great contrasts in pine forests were seen from the vast temperate pine forests of the Sierra Madre Occidental in the northern States of Chihuahua and Durango resembling those of southwestern United States to the subtropical pine forests of the southern States of Michoacán, Oahxaca, and Chiapas.

The trip was well organized with a detailed schedule. Local foresters served as hosts and guides at each stop and distributed many helpful publications, some specially prepared for the event. Visits were made to the different pine forests, mostly mixed forests of three to five species of pines, through a wide range of climatic, altitudinal, and soil conditions. Tours were conducted through the modern sawmills and other wood utilization plants, including plywood factories, paper mills, a cellulose plant, and resin extraction plants.

Large areas of commercial pine forests were seen to be under good forest management. The land is privately owned and partly in community forests but not in national forests. Cutting by the larger sawmills is supervised by foresters, is conservative, and on a sustained

yield basis. From forest inventories to utilization, modern methods are employed. Some research is in progress, for example, at the national forest research institute in Mexico City, and more is planned. The hosts explained that the development and utilization of the pine forest resources were by Mexican technicians and with Mexican capital.

Several species of Mexican pines extend north of the border into southwestern United States. The tour presented an opportunity to see these pines, collect specimens, and study intergrades and replacement southward. Typical ponderosa pine (*Pinus ponderosa*) was not observed on the short trip to Chihuahua but is replaced there largely by Arizona pine (*P. ponderosa* var. *arizonica*, also known as *P. arizonica*), Apache pine (*P. engelmannii*), and Durango pine (*P. durangensis*). Some lumber exported from northern Mexico into the United States as ponderosa pine perhaps is partly from these related pines.

Small seed samples of 10 species of Mexican pines were distributed to the participants. The expansion and improvement of seed collection in Mexico was discussed, and emphasis was given to selection of the seed trees. Foresters from different countries were invited to send requests of their seed requirements.

As the United States is amply supplied with 35 well adapted native species of *Pinus*, it seems unlikely that Mexican pines would be grown extensively in plantations in this country. Besides, most Mexican pines apparently would not be hardy except in the subtropical southern areas or the Southwest. However, some Mexican pines should be suitable for plantations in Hawaii and Puerto Rico, where trials were begun earlier. Also, the Mexican pines may serve in forest genetics investigations through hybridization with native species and will be planted in arboreta at the Institutes of Forest Genetics at Placerville, California, and Gulfport, Mississippi.

The seminar, following the tour, was held in Mexico City the last week in October. Observations and results of the seminar and tour will be published as a volume by the FAO headquarters in Rome. According to the interests of the participants, sections were organized to prepare parts of the report for botany, seed collection and tree breeding, silviculture, soils, plantations, and utilization. Additional statements summarizing experiences in planting Mexican conifers were written by the representatives of the various countries. When issued, the report as the cooperative effort of many persons should be a comprehensive reference on Mexican conifers in world forestry.

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Results of Trials of Modified Acrylic Polymers in Grafting Slash Pine

Two substances with possible application in plant propagation recently became available. Both substances have a modified acrylic polymer as an active ingredient, and both have been tested at the Lake City (Florida) Research Center of the U. S. Forest Service.

One substance, identified as TAT P.T.A., was suggested for use in treating tree wounds. Properly used it forms an elastic water-impervious film, and as a substitute for grafting wax, it offers the advantage of needing no heat prior to field grafting.

The other substance, TAT LOK, is similar to TAT P.T.A. and was suggested for use as a spray or dip to reduce transpiration, which presumably reduces transplanting "shock." It can be diluted with water, and was tested as a scion dip to reduce transpiration while the graft union was healing.

These two substances were tested on a total of 541 grafts of slash pine (*Pinus elliottii* var. *elliottii* Engelm.). Scions were obtained from 30 trees ranging in age from 11 to 37 years. From 4 to 48 grafts were made of each clone. Nearly all the work consisted of bottle grafts, although a few cleft grafts were made and are included in the data. Grafts were classified as successful if the scion was sufficiently healthy and vigorous to be suitable for outplanting.

As far as possible, each group of scions constituting a clone was divided into four parts, and each subgroup was assigned randomly to one of the following treatments:

1. Grafting wax only
2. Grafting wax plus TAT LOK
3. TAT P.T.A. only
4. TAT P.T.A. plus TAT LOK

The over-all results show that TAT P.T.A. is a suitable substitute for grafting wax, on the basis of graft success (Table 1). TAT LOK, on the other hand, seriously depressed graft survival.

TABLE 1.—RESULTS OF SLASH PINE GRAFTING BY TREATMENTS

Treatment	Total grafts attempted	Successful grafts	
	No.	*No.*	*Percent*
Wax	151	63	41.7
Wax + TAT LOK	120	20	16.7
TAT P.T.A.	146	68	46.6
TAT P.T.A. + TAT LOK	124	14	11.3
Total	541	165	.....
Average	.....	.....	30.5

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Germination of Stratified Latex-Coated Loblolly Pine Seed After Submergence

In a recent study, submergence for 14 days had no deleterious effect on the germination of stratified, latex-coated loblolly pine seed. This finding has practical significance in direct seeding, where stratified and repellent-coated seeds often lie submerged for many days following heavy rains.

Seed was stratified in wet sand for 30 days at 37°F. and then coated with Dow Latex. Samples were placed in stainless steel screen containers and submerged in water 4 inches deep. The bath was fully exposed to sunlight in a greenhouse; air temperatures ranged between 57° and 93°F. Submergence was for 0, 1, 2, 4, 6, 8, 10, 12, and 14 days.

The tabulation below shows the percentage of full seed that germinated after 28 days in a sand flat, following submergence. Results were also evaluated by Czabator's Germination Value (GV)[1], which varies directly with speed or totality of germination, or both. Higher GV ratings indicate more vigorous germination.

Days submerged	Full seeds germinating	Czabator's germination value (GV)
	Percent	
0	51	8.02
1	44	5.63
2	38	4.61
4	41	5.43
6	47	7.04
8	48	7.31
10	46	6.59
12	52	8.22
14	49	7.74

Statistical analysis showed no significant difference among treatments, either in total germination or GV ratings.

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[1]Czabator, F. J. A formula for evaluating germination tests. Unpublished; on file at Southern Forest Expt. Sta., Forest Service, U. S. Dept. Agric., New Orleans, La. 19 pp. 1958.

Delayed Killing of Young-Growth Douglas-Fir by Sudden Cold[1]

Weather conditions during the "deep freeze" of late 1955 in the Pacific Northwest, and resultant damage to forest trees observed the next spring, have been described by Duffield.[2] Much of the killing did not become evident, however, until the second growing season after this unusual cold snap, and it was then subject to some confusion with damage from other agents.

In 1957, hundreds of small groups of trees became red topped in an extensive and well-stocked stand of 25- to 30-year-old Douglas-fir averaging about 8 inches d.b.h., on a good site in northwestern Oregon. Groups typically consisted of three or four trees and were scattered apparently at random through the stand. A ground examination in 1958 showed that bark-beetle galleries and several species of fungi were fairly common in the killed trees, but no evidence of primary parasitism could be found.

Downward-growing callus layers, one ring thick, occurred irregularly but completely around the trunks of these dead trees, between about 8 and 12 feet from the ground. Callus was also found around occasional small patches where the cambium had been killed at slightly greater heights. Some of the callus layers were thin, but most of them were about one-half to two-thirds as thick as the preceding annual ring. Frost rings were plainly visible behind the lines of initial callus formation.

Immediately adjacent to the groups of killed trees, many of the living trees were irregularly swollen and bark cracked between about two and nine feet from the ground—a result of callus formation where small patches of cambium had been killed between the 1955 and 1956 growing seasons. Conspicuous frost rings were present between the 1955 and 1956 annual rings behind the callus (Fig. 1). On most of the trees whose basal cambium had been partly killed, four or five feet of the tops had likewise been recently killed. These conditions also occurred, although less commonly, in other parts of the stand.

From these observations it is evident that the 1955 cold snap killed part or all of the basal cambium, as well as the upper few feet of the crowns, of numerous trees

FIG. 1.—Frost ring (arrow) and callus layer on 8-inch d.b.h. Douglas-fir.

[1]The author is indebted to Robert Lindsay, Crown Zellerbach Corp., and Paul Vance, Kaiser Gypsum Co., who first observed the damage described herein and assisted in the examination.

[2]Duffield, John W. Damage to western Washington forests from November 1955 cold wave. Pacific Northwest Forest and Range Expt. Sta. Res. Note 129. 8 pp. Illus. 1956.

in this stand. Cambium on intermediate parts of the trunks was affected less severely or not at all, so that the completely girdled trees remained green and continued to form new wood until the translocation stream was stopped by root starvation or by sap stains.

The grouped distribution of affected trees cannot be attributed to local variations in temperature during the cold snap, since winds were strong throughout this period and since grouping of kills was distinct, even on steep hillsides where cold air could not have accumulated. This damage pattern apparently resulted from slight but sharply localized differences in environmental conditions existing shortly before the cold snap, such that trees on certain small areas were a day or so slower in becoming fully dormant than were the trees in the rest of the stand. No relation could be detected between damage and either topographic or stand features.

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Florida Longleaf Pine Fail in Virginia

Since 1954, when the huge study of geographic sources of southern pine seed got underway, plantations scattered throughout the South have been testing theses concerning the possibility of racial variation in southern pines caused by temperature zone, latitude, and longitude.[1] Now, after 6 years, a plantation of longleaf pine in Nansemond County, Virginia, established to see if racial variation is primarily associated with differences in temperature, has some interesting data to report.

Highly significant differences in height and survival were apparent after six growing seasons (Table 1). However, height and survival were not significantly related to temperature zone, or latitude, or longitude of the seed source. Omission of the Florida source does not affect the results. These relationships will be explored more thoroughly when the Subcommittee on Geographic Source of Seed of the Southern Forest Tree Improvement Committee analyzes all the results of the regionwide study.

TABLE 1.—SIX-YEAR HEIGHT AND SURVIVAL OF LONGLEAF PINE OF DIFFERENT GEOGRAPHIC ORIGIN PLANTED IN VIRGINIA

Seed source	North latitude	West longitude	Approximate average annual temperature	Survival[1]	Average height[1]
			Degrees F.	*Percent*	*Feet*
Nansemond County, Virginia	37°	77°	60	90.3	7.76
Rapides Parish, Louisiana	31° 12′	92° 42′	67	87.8	7.42
Harrison County, Mississippi	30° 36′	89° 04′	67	81.2	7.38
Treutlen County, Georgia	32°	83°	67	76.4	7.76
Hillsborough County, Florida	28°	82°	72-73	48.0	2.51

[1]Sources included within the brackets are not significantly different at the 1 percent level.

Longleaf seedlings raised from seed sources in Florida, Louisiana, Mississippi, Georgia, and Virginia were planted in February 1954 in Nansemond County, Virginia. Four replications, each containing 49 trees spaced 6×6 feet, were planted for each of the five seed source locations.

As in most experiments of this size, certain unforeseen outside influences confounded the data being sought. Hog damage was so severe in one of the Georgia replications that information on this plot was discarded. Sonderegger pine, a hybrid of longleaf pine × loblolly pine, was discovered in seedlings from the Virginia seed source. At the end of the sixth growing season, 36 of these trees were considered phenotypically not longleaf and were excluded from the height growth comparisons.

The Florida longleaf pine stock has been the least vigorous since the plantation was established and has consistently had the poorest survival. At the end of the fifth growing season the seedlings were growing rapidly when the tops were apparently killed by severe frosts (Fig. 1). From November 30 through December 3 the low temperatures at the nearest weather station nine miles away were

FIG. 1.—Injured and healthy longleaf pine seedlings from Florida at the end of the fifth growing season (foreground) and uninjured trees from other geographic locations (background).

[1]Wakeley, Philip C. Five-year results of the Southwide pine seed source study. Proc. of the Fifth Southern Conference on Forest Tree Improvement. pp. 5-11. 1959.

12°, 15°, 26°, and 26° F. Some of the damaged seedlings put out new shoots the following growing season, others died.

These results indicate, as have other racial variation studies, that it is generally best to plant seed of local origin. Seed from the warmest part of the longleaf pine range are not suitable if the seedlings are to be planted in the northern part of the range.

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The Graduation of Diameter Tapes

Diameter tapes are in such general use that it may seem unnecessary to comment on them. However, it would appear that many types are still being offered for sale graduated in a sequence used for linear measurement. This is especially inconvenient when fractional inches of diameter are to be measured. For this purpose it is essential that an inch of diameter (3.1416 inches on the tape) be provided on the zero end of the tape before the zero mark. This section can be graduated in 1/10th or 1/100ths as desired. When placed around the tree the full inch marks will then intersect the fractional scale and the diameter can be read in inches and fractions directly. Tapes that have fractional graduations between the 1-inch and 2-inch marks or between every inch can easily lead the user to read the wrong whole inch, unless one inch is subtracted each time, a wholly unnecessary nuisance (Fig. 1).

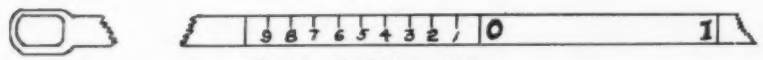

FIG. 1.—Graduation of tape.

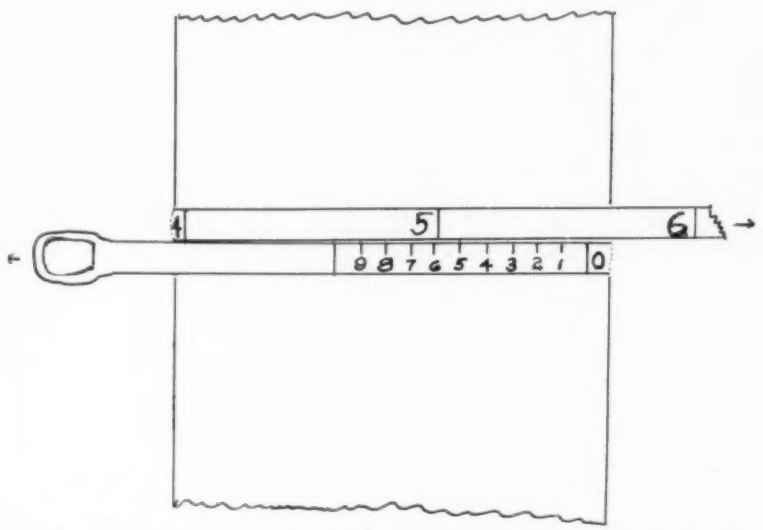

FIG. 2.—Method of measuring a 5.6 inch tree. Ring is held in left hand, body of tape in right hand.

The writer has used tapes graduated as in the illustration since 1920 and has had no difficulty obtaining them. Special graduation is not costly. Usually a 20-foot steel tape of ⅜ inch in a hand-wound steel case is specified, such as Lufkin "Home Tape." These sell for about $4.00 and specially graduated tapes of this kind have cost about $5.00 each. No hook on the end is necessary in small eastern timber. In fact it is a hazard. A hook can easily be improvised and attached with a snap ring or clip when needed. It is much more comfortable and quicker to use a tape without a hook.

The tape is customarily buttoned in the shirt pocket, a few feet unreeled and the end passed around the tree with the left hand while the right hand grasps another part of the tape. Fractional inches are read opposite the whole inch mark as shown in the sketch (Fig. 2).

It is self evident that the diameter graduations must be on the outside of the tape as it is wound in the reel to avoid bending the tape back on itself at every measurement and at every winding up. There is no need for any graduations on the inside surface of the tape, but standard tapes come graduated in feet and tenths and this can occasionally be useful. A perfectly serviceable diameter tape can be made from metal strapping by scratching the graduations with a file.

The important point is: Graduation of fractions of inches should be *in front* of the zero point, *not* between zero and 1 inch or anywhere else.

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Correction

In the index page caption for the cover photograph of the April issue of the JOURNAL the term "rafted" was erroneously used; it should have been "driven" or "floated."

The Editor

Points of View

Editor's note.—With a total of some 57 persons, Sweden had the largest contingent of any country outside the American continent at the World Forestry Congress in Seattle in the autumn of 1960. This remarkable showing indicates the great interest of this small country in forestry, and in the U.S.A. Much has been published in Sweden giving the impressions gained of American forestry by Swedish visitors. The accompanying two items appeared in the Swedish forestry magazine *Skogen* and are republished here, by permission, as of interest to American readers.

North American Forestry[1]

A great many impressions are felt, of course, by all those who, like this writer, had the great privilege of participating in the World Forestry Congress in Seattle and in some of the tours in connection with the Congress. First, it ought to be said that a common impression (of Swedes) is that conditions of forestry, and for that matter of other fields of endeavor, are greatly different in North America from the conditions here (in Sweden) and in the rest of Europe. Especially different in forestry is its relation to water supply and to many problems arising from forest fires and erosion; certainly we (Swedes) are fortunate in escaping or in overcoming practically all of those problems.

It is dangerous to generalize from what one saw during a rather short visit to the great country in question. Notwithstanding this, I shall try to give some of my own impressions. In this number of *Skogen* are two articles by Swedish foresters, one by a man who was active in America for many years, and the other by a man well versed in labor matters. We hope that both of these articles, together with descriptions of the Congress and of some of the excursions—in future numbers of *Skogen*—will expand knowledge (in Scandinavia) about North American forestry.

For 330 Swedish miles (ca. 2,000 English miles) by bus through North America's westernmost states, California, Oregon, and Washington, the journey passed through large expanses of exploited forests without visible forestry treatment. One poses the question: How long will the forests, where all cutting is clearcutting, extend into the future? The answer which was given varied between 25 and 50 years, and very probably, according to certain experts, lies nearer 25 than 50 years. Anyhow, when one sees these expanses of old cut-over tracts with solitary standing trees and overgrown with hardwood and brush vegetation without apparent value, it becomes clear that there must result a very large gap in proper age class distribution. There was therefore much comment to the effect that the continent will experience a timber shortage in the not too distant future if the present rate of utilization continues. This forces cutting into more and more distant forests. This will cost money and raise the price of timber at the mill. Canada especially has great areas—according to reports two-thirds of the total forest area—which lie beyond economic accessibility limits. On the other hand we saw stands of 70-year-old so-called "second growth" Douglas-fir of 54 meters (175 feet) average height and 18 inches average diameter, a very striking indication of what large areas of land on the West Coast—almost exclusively "brown soil"—can produce. There, however, people appear to be at the same stage as we were during the last half of the previous century; they remove the forest growing stock without thinking much of the future. Another impression was that very little attention is given to the importance of thinnings.

It ought to be emphasized that we did see many excellent measures for the establishment of new forests. Interest in these has developed especially since World War II. That the forest industries are a moving force in this action can be explained partly because they perceive some danger that their timber supplies will run out and partly because they want to avoid government intervention in the forest economy which might result if no forestry measures are undertaken. Amer-

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[1]Commentary by Hans Hedlund in *Skogen*, October 28, 1960. *Skogen* is the biweekly organ of the Swedish Forestry Society. Hedlund is its executive director and a leading Swedish forester. Translation by R. E. Marsh.

Current Aspects of Industry-Labor Relations in USA[1]

A description and judgment concerning industry-labor relations (in Sweden referred to as labor market questions) in a country requires a good knowledge of the country's economy, ways of thinking, and traditions. Five weeks of diligent observation of USA's labor conditions has naturally given some opportunities for drawing conclusions. However, one must be cautious in his judgment and refrain from too definite generaliztions. Among other things one must keep in mind that the country is divided into 50 separate autonomous states with sharply varying conditions, and also that the USA is an enormous country.

With these reservations I venture a brief description of labor conditions in the USA with reference to forest activities. My information is based on many contacts with official industry-labor relations, employer associations, trade unions, training centers, and also with metal and forest industries.

Parties in the Labor Situation

"Several employer associations in each state loosely related among themselves, no top organization, and two information meetings each year for the country's employer associations as a whole." Thus one employer-director describes the situation. Forestry and forest industry can likewise have several employer associations in one state. On the labor union side there is one top organization; the American Fed-

(Continued on page 456)

[1]An article by S.-I Sjöstedt in the October 28, 1960, issue of *Skogen*, the biweekly publication of the Swedish Forestry Society, based on observations in connection with attendance at the Fifth World Forestry Congress. Translation by R. E. Marsh.

Mr. Sjöstedt is chief of the personnel division of the Swedish Forest Service. Among other things, this division conducts investigative "work studies" in which the Swedes are well advanced. Mr. Sjöstedt is an expert on work technique, safety measures, etc. He represents Swedish agencies at many international meetings concerned with forestry and forest industry labor. Currently he is the leader of an ILO team in Yugoslavia which is conducting a vocational training project that concerns all branches of industry including agriculture and forestry.

North American Forestry

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ica is indeed a land characterized by a high degree of private enterprise.

Timber prices and costs of lumbering were of very special interest to us. It can be said that the mills get their timber considerably cheaper than in Sweden. Our country's prices are about 50 percent higher. Then when one realizes that forest workers earn approximately double—in some cases three times—what they get in Sweden, one can believe that efficiency and mechanical methods ought to be highly developed. But we did not gain such an impression. Of course there are great trucks with high load capacity—equipped with trailers and powerful loading cranes—well adapted to the huge dimensions of redwood and Douglas fir. But when we saw the same machines being used for timber only somewhat larger than typical Swedish timber, we became a little dubious about such excessive use of power. It is learned, however, that in Canada there are certain machines which can be adapted to our style of forestry, including thinnings, etc. Our work study organizations will certainly listen with interest to this. In this connection it can be said that in the development of purely conventional methods, for example logging with horses, we have advanced much further.

If one now brings these facts together, it is evident that stumpage value is a matter to which they do not attach so much weight in North America as in Sweden. It can be said that there is an abundant supply of forest—at least at present—so there is not so much justification for high stumpage values. Continuing this line of thought one gets the impression that the forest still consists mainly of stands which are being exploited while we have come rather far along the road of treating forests entirely as a producing "apparatus."

In addition there ought to be mentioned another surprise—at least for me—which was that the forest industries we visited are not so efficiently developed as one might expect. In my opinion labor often was not used as effectively as it ought to be, and many times we saw cases of unnecessary rehandling of timber. Many Swedes with me therefore considered that in the field of mill technique we by no means lag behind. Certainly there were some huge manufacturing plants, and this influenced the results. This is especially true of pulp mills. The evident explanation is that when they get timber so cheap there is scarcely any incentive for greater efficiency.

The strongest impression and the one which made a great impact on us Swedes was, however, the Americans' efforts to use forests as places for recreation and thereby to try to make forests popular with the public. One is greatly impressed by the huge area which is set aside as national parks, by all the arrangements which are made to be friendly toward the public, and by the attractive and appropriate information which is made available. In this field we are behind, and we ought to be able to do considerably more along this line.

Finally it must be emphasized that we were overwhelmed at the sight of the redwood trees of extraordinarily great size which still remain in certain reservations. A living forest like this —with trees which were saplings at the time of the birth of Christ and now attain a height of 100 meters (325 feet) and breast-height diameter of 4 to 5 meters (13-16 feet)—compares favorably with such human works as the mightiest construction undertakings of classical antiquity. Foresters stand in silent admiration before what Nature has here created.

Current Aspects of Industry-Labor Relations in USA

(Continued from page 455)

eration of Labor & Congress of Industrial Organizations (AFL-CIO). The first trade union for forest labor, the Industrial Woodworkers of the World, was active in the period 1917-1920. Between 1920 and 1935 there was no forest labor union. In 1935 there was organized the International Woodworkers of America (IWA), affiliated with CIO. In addition the Lumber Workers Union (LWU) was organized mainly by sawmill workers, and was affiliated with AFL. (At that period CIO and AFL were separate national organizations.)

Firm Attitudes at the Conference Table

Some trade union leaders, in the steel industry among others, were strong men who led the unions along purely economic lines. The forest worker unions followed a more Swedish-like policy, one of firmness toward both the employers and their own members. The forest worker unions' negotiation atmosphere appears to be like that in Sweden: strong arguments at the negotiation table, but after agreement is reached there is peace and friendship between the representatives. There does not appear to be much collaboration between the parties on noncontroversial questions with the exception of American industry's favorite subject—worker safety.

Natural Resources and the Labor Force

According to the European point of view many sectors of American forest labor organization are not well developed. One quickly finds reasons for this—or better, some of the reasons.—What is said here concerns mainly western America.—There they still utilize huge virgin forests. Thus they are removing capital which will never be restored in the same size, volume, and vigor. The virgin forests will last another 20-odd years. After that they will begin to chop into second growth. But even this second generation grows vigorously, at least up to the dimensions of Swedish forests. This, then, is some of the background that explains the less careful analyses, calculations, and job studies in America than in less well favored forest countries—middle Europe and Scandinavia. Forward-looking American foresters, however, begin to think about analyses and job studies. The supply of forest labor is good. Any discussion of need for more forest labor is seldom heard. Continued progress of mechanization requires more machines, not more men, according to forest authorities.

Wages

The average wage in industry amounts to about $2.50 per hour. With 40 hours per week this amounts to an annual income of about $5,000. Forest employment offers about the same as industry. Earlier, because of labor shortage, the West Coast wages were considerably higher than in the East. This wage differential is diminishing. The above-mentioned annual income literally would amount to about 26,000 Swedish crowns. Taking account of differences in living costs, taxes, social advantages, etc., the real wage is certainly higher than the corresponding Swedish wage, but still not anywhere near the level of 26,000 crowns in Sweden.

Setting wage rates on individual forest operations is known to be an involved and difficult problem in Swedish forest administration. What a lot of time, pains, cost, and emotion are spent in studying the half-point difference that will finally tip the scales between a standard and a substandard wage rate! Our American brothers waste little or no time on such fine nuances. On the contrary, one wage rate regardless of terrain, character of the trees, climatic conditions, and

other factors. Still, some wage adjustments do occur, but these are the exception. Earnings may vary as much as 100 percent from one day to another, according to what I have been told. Never mind so long as the people are happy! Truth in Lycksele (a forestry center in Sweden), *but* is it true in the forests around Lake Michigan?

During one logging area excursion some European foresters worried the leader with questions about forest worker wages. According to local information, the fellers (two in a crew with power saws and wedges, felling trees from three-fourths to one meter d.b.h.) might earn $5.50 per hour, while in contrast "high riggers" (who climb with spurs up a swaying trunk—a fantastic spectacle—and saw off the top at a diameter of 12 inches) earn only $2.90 per hour. This inequality did not trouble the local work leaders. They tried to explain why it was justified. An older American forester clarified the situation by saying that the fellers still work under a manual labor agreement. The union stubbornly insists upon continuation of this basis. No time studies!

Logging Camps in Times Past

America's famous logging camps which during and after the war were of high quality, are now being liquidated. Forest workers now live mostly in their own homes. Transportation is by their own automobiles, or in company busses. Parking spaces are at least as important a subject as roads and log storage places.

Vocational Training and Worker Safety

Under this heading much could be related. Two points are stated to begin with: (1) America makes worker safety a major objective; and (2) American forest labor is separated into two categories: fellers, and other forest workers. The fellers are the dominant category.

With regard to point (1), worker safety is considered to be a dominant problem side by side with wages. However, forest worker safety measures are of very limited character. They are concerned mostly with making equipment safe and with brief, "on the job" training for "dangerous situations." At the Congress in Seattle the writer presented a paper on forest worker training and worker safety. In this were included as very important points work physiology, athletic training, and various other features of bodily care in heavy work. These appeared to be unknown ideas in America's forestry. The *Seattle Times,* along with the *New York Times,* America's greatest newspaper, commented on this paper but quoted only from the physiological part under the heading "Athletic Training for Forest Workers."

Concerning point (2), it should be remembered that at present relatively little actual forestry, planting, and artificial seeding are carried on. Nature is very generous without the help of foresters. Thus forest work is primarily felling and logging.

The above-mentioned paper was designated by the Forest Congress Secretariat as "Training and Safety of Logging and Forest Workers," a meaningless title unless one understands the American background.

In America forest worker training, according to European thinking, does not exist at all. In America they talk of long experience on the job as the basis of vocational skill. The above-mentioned Swedish paper on training attracted many individual questions. The trend will be toward vocational training in its proper meaning. Even the trade unions are prisoners of the experience line of thinking. The training discussion moved rather quickly into "safety."

The greatest part of all logging is done through contractors, who do all of the work, own the machines, employ the workers, and pay them. American trade unions seem to accept contractors. Their responsibility for the labor force was the subject of much discussion. In the question of responsibility there was considerable variation from one state or work locality to another. In any event, one dares to assert that worker training is hardly promoted by the contractor system.

Society for Economic Botany

The Society for Economic Botany, an international scientific organization, invites your participation and welcomes your membership.

The objective of the Society is the promotion and stimulation of scientific studies of plants useful to man. The methods of achieving this objective are annual meetings, technical conferences, and publication of *Economic Botany,* the official journal of the Society.

Present members in the Society for Economic Botany represent nearly all scientific disciplines: anthropology, pharmacology, geography, agriculture, chemistry, physics, and all fields of botanical science. The only prerequisite for membership is an interest in the study of the past, present, or future use of plants to man.

Membership dues are $7.50 (U.S.) annually, and include one year's subscription to *Economic Botany. Economic Botany* publishes monographs, review articles, and original manuscripts on all subjects relating to the use of plants and plant products.

Inquiries and dues can be sent directly to the Treasurer, Richard M. Klein, The New York Botanical Garden, Bronx Park, New York 58, N. Y.

Book Reviews

Water and Agriculture

Edited by Roy D. Hockensmith. viii + 198 pp. Illus. Publication No. 62 of the American Association for the Advancement of Science, Washington, D. C. 1960. No price indicated.

Ever since the American Association for the Advancement of Science was organized 121 years ago "to promote progress in all fields of science," its symposia have continued to add to our knowledge of water in its many facets. The foundations for our present understanding of the role of land in the water cycle were laid at the AAAS meeting in 1873 when Dr. Franklin B. Hough, physician and scientist of parts, presented his views on the importance of forests for water supply. Subsequent meetings considered this and related issues. The 1958 symposium thus constitutes the latest link in a long chain of timely endeavors to keep the nation abreast of scientific and technologic achievements—and, to an increasing extent—the legal and economic complications these achievements have given rise to. *Water and Agriculture* stresses, but by no means restricts itself to the scope its title implies. As Editor Hockensmith states, "comprehensive planning for the development, conservation, control, and use of water along with increased efficiency . . . are all essential," and there is "no clear line between water for agriculture and water for other purposes."

The book is divided into four parts, each in turn containing four papers. Part I "Water for the Future" includes an over-all survey and projection of agricultural needs in the context of our total water requirements, and the technological breakthroughs that can be expected to increase the availability of existing or potential supplies; Part II "Water Sources" describes the water cycle, possibilities for modifying rainfall and how climatic data can be used to increase the supply and efficiency of water use; Part III "Water Planning and Use" covers both the technical and economic components of utilizing water resources and allocating their development costs; Part IV "Water Control" deals with the principles and practices of managing water and vegetation to reduce waste and improve water application. It is to be regretted that two of the topics are represented only by abstracts, and that the papers are not better grouped by subject matter.

Foresters are daily more cognizant that considerations of water are affecting the policies, practices, and evaluations that determine what aspects of public and private forestry shall receive attention and how much. *Water and Agriculture* contains vital ideas that clarify the functions of forests and their similarities and differences with other types of land. And it calls attention to the future trends that will shape in large measure the kinds of services these lands will be called upon to provide, and that will help guide foresters and other land managers in providing those services.

BERNARD FRANK
Colorado State University, Fort Collins

High Timber: The Story of American Forestry

By Charles I. Coombs, 223 pp. Illus. The World Publishing Co., Cleveland and New York. 1960. $4.95.

This new book was written by Mr. Coombs for ages 12 and up, yet the material included serves well for adult laymen interested in the forestry and resources fields. It is a comprehensive history of forestry in the United States with major emphasis on the present-day state of the profession and practice of forestry, and on the modern forest products industries. The author, a resident of Los Angeles, has written many books for young people but this is his first volume in the forestry realm. He has, however, penned stories and articles on this topic. His interest in forestry stems from boyhood vacations in his family's cabin in the San Bernardino National Forest in California. His personal background closely allied with a national forest and a material-gathering trip into the Pacific Northwest tend to give his book a heavy Western flavor as well as an overbalance of narrative on the place of the U. S. Forest Service in the over-all forestry picture. The South, Lake States, and Northeast have made notable strides in forestry which are deserving of more attention if any teen-ager is to get the true national picture of the direction forestry is taking in the second half of this century. Also, the forestry activities and accomplishments of the various states, federal bureaus and private organizations, and the colleges escape their true reward in this *Story of American Forestry.*

The book is otherwise fairly complete and accurate and is profusely illustrated. Its No. 1 attribute is that it gives an excellent analysis of the interplay of the forces of nature and society and how they affected the building of America from colonial days to the present. Virtually every chapter can act as a springboard for detailed classroom discussion. Since the whole spectrum of forestry is presented, chapter by chapter, the book can provide a basic appreciation and understanding of the importance of forestry to the welfare of the nation. For example, the author very adequately gets across the theme of multiple use, and rightfully devotes the initial chap-

ter in this category to "Woods and Water." He carefully explains how a forest performs its duties as a watershed while still providing timber crops. He does not overstate the importance of professional multiple-use forest management when he asserts, "The health and economic security of all American citizens depends to a large degree on how well the nation's forests are managed."

And, under "Woods and Wildlife" Mr. Coombs reaps the benefit of considerable research into the subject by fairly presenting both sides of the hunter-timberman situation, emphasizing the fruits of cooperation rather than conflict of interests. The reviewer is puzzled, though, why Mr. Coombs chose to present the history and description of the American Tree Farm System under the heading of "Woods and Wildlife," even though Tree Farms are an important provider of food and cover for forest animals.

Chapters on recreation, logging, products (one of the best), fire, pests, and forestry-as-a-career, plus the biology of trees combine to make an authoritative, interesting and worthwhile book. The reviewer gained the most pleasure from the opening, in which Mr. Coombs deftly wove a story of forestry's first footprints on North America, from the days of viking Leif Ericson on through the 1800's when timber literally built America into a great and powerful nation.

Our profession can be grateful for such a book and for an author such as Mr. Coombs who took the pains to produce for our schoolchildren such a creditable account of forestry and the work of foresters.

WARD C. WILLIAMS
Zurich, Switzerland

Late-Pleistocene Environments of North Pacific North America

By Calvin J. Heusser. xxiii + 308 pp. Illus. American Geographical Society, New York. 1961. Cloth $6. Paper $4.

If you are a bit confused as to the Pleistocene or the Late-Glacial periods, this is the book to bring you up to date. It can be very useful to foresters who would like to have a compact history of glaciation, physiographic, climatic, and biotic changes along the North Pacific Coast since the last ice age.

Specificially, it is a study of palynology and peat stratigraphy of muskeg, lake, and bog deposits. This being interpreted means a study of pollen grains and spores, especially with reference to the strata of peat in which they lie. By means of pollen analysis it is possible to interpret not only vegetation changes but also past climates and other environmental factors. Dr. Heusser sampled 114 areas from Fort Bragg, California, to Kodiak Island, Alaska, and explains his methods, both field and laboratory, for the benefit of those who may wish to use the system.

The author, Calvin J. Heusser, a research associate of the American Geographical Society, began the study in 1950 as a member of the Juneau Ice Cap Research Project and later extended it through eight successive field seasons to other parts of Alaska and southward along the North Pacific Coast to California.

The first four chapters deal with past and present glaciation, variations in coast levels, climates, and vegetation. A chapter on regional vegetation includes distribution maps of twelve conifers and discusses present vegetation both tree and shrub of the ten subregions involved. This material and Chapter 8 on Late-Pleistocene vegetation, environments and chronology will be of most interest to foresters.

In southeast Alaska, for example, during the Late-Glacial period (about 10,000 years ago) lodgepole pine occurred as the only coniferous species, with sedge, willow and alder. There were several ice-free areas (refugia) in coastal northwest North America from which plants migrated as glaciers melted. Lodgepole pine became the featured early postglacial invader participating in succession. During the Hypsithermal, or warm period, between 8,000 and 3,500 years ago, other conifers took over and lodgepole pine was displaced. A later shift to cooler and wetter conditions resulted in muskeg areas increasing again and lodgepole once more becoming established. Following the lodgepole pine maximum, Sitka spruce gained superiority much as it does on modern moraines as glaciers recede. Then, as on moraines, it was replaced by hemlock to a large extent. Periodic disturbances maintain a small percentage of spruce in the stands.

The author gives histories of this sort for each of the subregions sampled; one each for California, Oregon, and Washington, two for British Columbia, and five for coastal Alaska. An interesting addition, for plant ecologists at least, is a table listing all plants found on each sampling site.

Some of the terms used are undoubtedly new to foresters, but they are all well covered in a glossary in the appendix. On the whole, the book is not light reading but it is well worth studying and should be in the research forester's reference library.

RAY F. TAYLOR
Juneau, Alaska

Fire in the Valley

By Jack Hambleton. 156 pp. Illus. Longmans, Green and Co., Inc., New York. 1960. $3.75.

Mr. Hambleton, as a newspaper reporter and free lance writer about Canadian outdoor life, has a broad experience in Ontario's north country which is the scene of *Fire in the Valley*.

His book demonstrates very forceably that the opportunity to present factual data in an interesting documentary surely exists in forestry, although few people have taken the trouble to exploit this approach.

In the vast continuous forests typical of the Canadian north, con-

ditions of extreme fire hazard, all too frequently, ended in the destruction of hundreds of thousands of acres of valuable timber stands. These periods of extreme hazard are therefore the source of great anxiety to those responsible for the protection of these lands. The reader of *Fire in the Valley* is given an awareness of the tension that builds up under such circumstances and of the vigilance required on the part of those responsible for fire detection.

Inaccessibility of land adds many complications to the fighting of forest fires and requires maximum use of aircraft and suppression crews which must rely upon their ability to travel long distances on foot. From this book the reader gains a superficial knowledge of the fire fighting equipment used and its capacity in the hands of competent, but not expert, fire fighters. The organization of the detection and suppression personnel and the contribution made by the local inhabitants in dealing with the fire are both described in detail.

While the emphasis is on the story, made appealing through its spark of humor and romance, the reader finds himself with an appreciation of the trials of the Canadian forest ranger in dealing with his greatest enemy—fire; only a stint of duty at the ranger headquarters and on the fire line could make a more penetrating impression.

D. V. LOVE
University of Toronto, Toronto, Ontario, Canada

Newsprint: Producers, Publishers, and Political Pressures

By L. Ethan Ellis. vi+305 pp. +215 pp. appendix. Illus. Rutgers University Press, New Brunswick, N. J. 1960. $7.50.

In 1947, Dr. Ellis, professor of history at Rutgers University, did a case study in business pressures between the newspaper publisher and the newsprint manufacturer. Inevitable frictions have arrayed the two interests on oppoosite sides of a long series of controversies. The story takes the form of successive swings of the pendulum. It covers the period from 1870 to 1936 and has been aptly titled "Print Paper Pendulum, Group Pressures and the Price of Newsprint." It has appropriately been included in its entirety in the present volume as an appendix. The reviewer strongly recommends that it be read before continuing with the main portion of the book.

Newsprint: Producers, Publishers, and Political Pressures carries the narrative through World War II, its aftermath, the Korean crisis, and the developments of the mid-fifties, up to 1958. As an historian interested in economic patterns, the author has produced a detailed, carefully annotated study of the newsprint problem. The attitudes and positions of the two protagonists in the perennial struggle to adjust the balance of supply and demand are reviewed. The repeated inquiries by Congress, the Federal Trade Commission, and the Department of Justice receive thorough attention.

While it would seem that this book is only of interest to the forest economist, in the reviewer's opinion it would be interesting and informative reading for many others in the profession of forestry. The book is well-written; the printing and binding are very good.

IRVING H. ISENBERG
The Institute of Paper Chemistry, Appleton, Wis.

Minnesota Lands, Ownership, Use, and Management of Forests and Related Lands

By Samuel Trask Dana, John H. Allison, and Russell N. Cunningham. 463 pp. The American Forestry Association, Washington, D. C. 1960. $5.

The State of Minnesota has more public lands under its control than any other single state in the United States. In all, more than 9,000,000 acres of land are owned and managed by the state and the counties, mainly in the northern area. While the state forestry and other wildland management programs have evolved reasonably well over a long period of time, there still remain problems concerning the scattered pattern of holdings, overlapping of state, federal, and county forest unit boundaries, forest taxation, the need for more investment in intensive management of public lands, reservation of key recreational areas, and continued drainage of important waterfowl nesting areas.

In a complex situation such as this it is timely for The American Forestry Association to bring out this useful study of Minnesota forestry which developed from the recommendations of its so-called "Higgins Lake Conference" held in 1953. In the absence of action by Congress, The American Forestry Association took the initiative to select California, Minnesota, and North Carolina as states with forest land problems where pilot studies could be undertaken.

This Minnesota study was carried out under the direction of Dean S. T. Dana with the assistance of a distinguished panel of experts including R. N. Cunningham and J. H. Allison. An advisory committee of qualified foresters and others worked with the principal authors during the preparation of the report.

Probably the most valuable contribution of the report lies in bringing together much of the significant historical information underlying the land ownership pattern existing today. A great deal of interesting and useful historical material has been assembled and related to current statistical information. Interest in the report would have been heightened by giving more background and analysis on important events in the recent history affecting the situation in the state including: (1) the 1949 Long Term Timber Bill battle between those who worked to get 50-year leases on state owned timber and the

small concerns who saw this as a monopoly measure; (2) the far-reaching reorganization of the State Division of Forestry programs following the report of 1954 Forestry Study Commission of the Legislature; and (3) the integration of state cooperative forestry assistance programs with the Soil Conservation Districts.

A number of the critical problems and issues are identified and analyzed including: (1) the need for adjustment and consolidation of overlapping public forest units; (2) a modification of the property tax structure as it applies to forest lands; and (3) acquisition of wetlands important to waterfowl. While specific recommendations are not clearly identified, considerable encouragement is given to those engaged in developing these adjustments. Likewise it is of interest to see that the report suggests both the resumption of County Land Use Planning and acceleration of zoning—both of which have been neglected since the 1930's.

The book is recommended for Minnesota readers who are particularly interested in the public land ownership pattern of the state and how it developed in the early days.

CHARLES H. STODDARD
Technical Review Staff, U. S. Department of the Interior, Washington D. C.

Glossary of Genetics and Other Biological Terms

By Russell B. Clapper. 200 pp. Vantage Press, New York. 1960. $3.95.

The author has attempted to cover terms in the fields of genetics, cytology, and plant and animal breeding; also other biological sciences associated with these fields—namely, ecology, taxonomy, pathology, and evolution. In all some 2,500 terms are defined. This number would be somewhat reduced if terms to be found in the dictionary were excluded. The new book may be useful to those engaged in forest genetics as a reference beyond the scope of "Glossary for Forest Tree Improvement Workers" published for the Society of American Foresters in 1959 by the U. S. Forest Service Southern Forest Experiment Station.

F. H. EYRE

This Land of Ours

By Alice Harvey Hubbard. xv +272 pp. The Macmillan Company, New York. 1960. $4.95.

Perhaps one of the most timely of all conservation books which have appeared in some time, *This Land of Ours* sounds a bold warning of the dire need for thought and planning if we are to preserve much of the remaining natural beauty in this country and at the same time continue to meet the needs of an exploding population for recreation, water, outdoor beauty, and even well-organized living space.

The author has chosen a unique way of approaching the problem through a wide collection and assortment of down-to-earth suggestions as to what we can do by showing what others have done and how they did it. These valuable references have come from many sources, making the "Acknowledgments" chapter read like a modern roster of *Who's Who* among conservation and civic leaders in America.

While the book is more directly valuable to civic organizations, women's groups, service clubs, and those who are ordinarily engaged in projects of this type, it is equally as valuable for people everywhere who are interested in building better communities.

Despite our many faults, the American way of life has achieved for us the greatest productivity and the highest standard of living to be found anywhere in the world. A wealth of natural resources made our great nation what it is. The price we have paid for these many blessings has been a constant eating away of the very resources that have made our way of life possible. Generally speaking, the man in the street now knows that steps must be taken if we are to conserve and preserve our remaining resources and use them wisely in such a way that our children will also enjoy the same great wealth and high standard of living that we have enjoyed.

However, the thing that too often confuses John Q. Public is "what to do about it" and "how to do it" for recognized conservation needs. Therefore, Alice Harvey Hubbard has brought to us a wealth of information at a time when it is so greatly needed.

Copies of this book should be made available to all community officials and civic leaders. They, in turn, should see that copies are placed in the hands of key public officials who are in a position to take positive action and to afford leadership for worthwhile programs and projects.

Within the covers of this book are, first, a warning to all Americans that positive steps must be taken in order to maintain a rich and beautiful country as we know it. Secondly, there is an assurance that much has already been done and is being done through many successful and worthwhile programs and projects to conserve our natural beauty and resources. Lastly, there is a blueprint for action to guide those who want to do something and are probing for a place to get started.

Congratulations and thanks are due the author for having brought to all of us this timely and effective approach to a solution of conservation problems.

JAMES H. KITCHENS, JR.
Forestry Division,
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Current Literature

Compiled by LOIS MCALLISTER, *Assistant Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

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Society Affairs

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1960-1961

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Meeting of the Council

April 20 and 21, 1961

The regular spring meeting of the SAF Council was held April 20 and 21, 1961, in Phoenix, Ariz., at the Skyriders Hotel. Present were President C. A. Connaughton, B. E. Allen, W. C. Bramble, D. E. Clark, K. P. Davis, G. A. Garratt, W. D. Hagenstein, S. O. Heiberg, and R. J. Preston, together with Henry Clepper, executive secretary. Unavoidably absent were Vice President H. J. Malsberger and C. L. Tebbe.

Membership Standards Upheld

Dated December 2, 1960, the Society received from the Association of Minnesota State Forest Service Employees the following resolution: "That the Society of American Foresters reconsider the limiting qualification of graduate foresters to membership in the Society, and again accept membership from qualified, competent foresters."

The Council gave careful consideration to the foregoing resolution, and on a motion by Mr. Hagenstein, seconded by Dr. Garratt, unanimously adopted the following statement:

"The Council reaffirms its support of present membership requirements which were written into the Constitution by an overwhelming vote of the membership. Present membership requirements are in line with the requirements of other professional societies. The Council is strongly opposed to any change that would weaken the professional stature of the Society."

Foresters' Safety Code

The SAF Division of Education has a Committee on Safety (Seth Jackson, chairman) that promotes safety programs and instruction in schools of forestry and for the benefit of the profession at large. This Committee developed a safety code for foresters which was presented to the Division of Education at its meeting in November 1960 and which was referred to the Council with a recommendation for approval. The Council in turn referred the proposed code to Dr. Bramble for review; and with minor revisions suggested by him the code was adopted as a Society policy, on motion by Mr. Clark, seconded by Professor Heiberg, as follows:

As one responsible for the management of my country's forest resources I believe in the importance of safety. I recognize my duty as a professional forester to protect myself and the lives of those for whom I am responsible in the conduct of our forestry work. I recognize the unusually high hazards in many of the areas of forestry practice due to forest environment, isolated work areas with minimum supervision, forest machines and tools used. I will therefore do all within my power to carry on my work and to require those who are under me to perform their work in as safe a manner as is possible, consistent with getting the job done.

To carry out the responsibilities described above, I, as a professional forester, will endeavor to follow these basic principles of safety:

A. In the planning of my own work, I shall:
   1. Thoroughly acquaint myself with each detail in advance in order that I may avoid all real and apparent hazards which I may encounter.
   2. Display an attitude toward my own job and toward those jobs for which I may be responsible that will indicate an active interest in accident prevention.

3. Be conscious that I have a moral responsibility for the safety of all those who share in the performance of such work as I have planned.

B. In planning work for others, I shall:
1. Recognize safety as a cost element in forestry practice and plan for it so that it will not be sacrificed because of cost.
2. Obtain an accurate and detailed description of the real and apparent hazards of each job.
3. Acquaint myself with such statistical accident data as pertains to each job.
4. Comply with all pertinent safety codes—federal, state, local, or employer.
5. Practice and include the best principles of effective supervision.
6. Consider the legal requirements of appropriate compensation acts.
7. Be prepared to report, handle, and dispose of on-the-job injuries.
8. Delineate clear lines of authority and responsibility for safety as well as the practical individual and group accident prevention objectives.

C. In the execution of work for which I may be responsible, I shall:
1. Require a complete and thorough advance understanding of both individual and group responsibility for each job.
2. Show by both words and deeds my interest in the safety of others on the job.
3. Encourage subordinates to be alert to hazardous acts and conditions as they develop; then correct or report them promptly.
4. Dress in a manner and use personal protective equipment appropriate to forest hazards which may be expected, and require all others in my care to do the same.

Visiting Scientists Program

A visiting scientists program in forestry, supported by a grant of $15,700 from the National Science Foundation, has been carried on by the Society during the academic year 1960-1961. (Reference: JOURNAL OF FORESTRY, August 1960, page 668.) Henry Clepper is director of the program; George A. Garratt is the Council adviser. Dr. Garratt made the following report on the program:

On the first phase of the Visiting Scientists Program 13 visitors and 44 schools are participating. Thus far 34 of these visits have been completed and the remaining 10 are definitely scheduled.

Out of the total grant of $15,730, $12,558 have either been expended or are obligated, leaving a balance of $3,172 for the second phase. The program has cost about $280 per visit. Administrative costs have run less than 10 percent (15 percent is permissible).

On the second phase it is expected that we will pick up one school not covered on the first go-round—thus bringing our total to 45 participating institutions. In addition we hope to arrange repeat visits to 7 or 8 schools. Two additional visitors are being brought in at this stage—making the total 15 all told.

As originally planned, visits have been of 2 to 3 days duration. This seems to be adequate although some participants feel that visits should not be less than 3 days.

As near as can be judged from reports, the recipient institutions benefited about in proportion to the time they spent in preparation and planning for the visit. In general the program has been evaluated by host institutions and visiting scientists as highly successful, varying of course in degree. Some schools have been very enthusiastic about the results. There have been no adverse reports.

In a number of instances arrangements were made for a public lecture in conjunction with a local SAF meeting. Several suggestions have been received proposing that this aspect be specifically featured if the program is continued another year.

Although usually a month or more notice was given as to the availability of visitors, this proved to be too short a time for adequate planning and publicity by the host institutions. With the experience gained this year it should easily be possible to allow for more time in the future. This year no visits were made during the fall although an attempt was made to schedule a few. In the future with more advance notice, some fall visits should be made.

As yet we have no indication from the National Science Foundation that our application for extension of the program to 1961-1962 will be approved. We hope it will be.

Financial Report

The first quarter 1961 SAF financial report was discussed by Mr. Allen, chairman of the Finance Committee.

Mr. Allen was requested by the Council to go to Washington, D. C. in early December, following the audit of Society finances for the fiscal year December 1, 1960—November 30, 1961, for the purpose of working out with the auditor and business manager simplified financial reporting procedures.

The budget for the current fiscal year, as revised, is shown in Table 1.

TABLE 1.—1961 BUDGET

Income	
Dues	$131,000
Fees	1,200
Subscriptions and sales	13,000
Advertising	45,000
Miscellaneous income	3,000
Forestry Terminology	500
Society publications	1,000
Forestry Handbook	2,500
Interest and dividends	4,500
American Forestry	1,400
Forest Science (net)	(200)
	$202,900
Expense	
Journal of Forestry	$ 59,100
Editors expense	1,200
Salaries, editorial	21,615
Salaries, office	67,350
Advertising commission	10,000
Advertising expense	4,500
Travel, officers	4,500
Postage	4,500
Telephone and telegraph	1,000
Rent	9,912
Multigraph and mimeograph	850
Miscellaneous printing	1,800
Office supplies	1,800
General expense	2,600
Depreciation	2,000
Retirement plan	4,209
Dues affiliation, organization	360
Watershed Congress	100
Committee expense	300
Division expense	100
Grading schools	600
Council travel	2,000
Group hospitalization	650
Social Security tax	1,900
Election, Council and Fellows	1,400
Referenda	500
Annual meeting	500
Proceedings (1960)	1,900
Numbers of foresters, U. S.	200
Maintenance of equipment	600
Contribution Forestry Education Survey	3,000
Miscellaneous	500
	$211,546

Endowment Fund

An SAF Endowment Fund, with a goal of $250,000 was started in 1960 by a committee of past presidents of the Society with G. A. Garratt as chairman. He reported contributions of $2,200 to date, and recommended that the Endowment Fund be established by amendment of the Bylaws to include the Permanent Fund together with such other sums as may be contributed.

On a motion by Mr. Hagenstein, seconded by Dr. Preston, Dr. Garratt was authorized to draft a substitute for Bylaw 67, which on presentation was unanimously adopted as follows:

Bylaw 67. The Endowment Fund of the Society shall be established by the combination of the Permanent Fund and such sums as have been given specifically for endowment fund purposes. All interest earned on Endowment Fund investments shall be added annually to the principal of the fund until it reaches a predetermined goal (initially $250,000) or until the Council shall direct the use of such annual income for some other special purpose. The Endowment Fund shall also be increased annually through contributions for that specific purpose, and through the addition of such percentage as the Council shall direct, but not less than ten (10) percent of both the interest received from other available investments and the net annual earnings of the Society. The raising of funds for Endowment Fund purposes shall be under the direction of a committee of past presidents of the Society, acting under the chairmanship of a member of the Council appointed by the President.

On a second motion by Mr. Hagenstein, seconded by Mr. Clark, the Council unanimously directed that the Endowment Fund Committee have a member of the Council as its chairman.

In addition, the Council requested Dr. Garratt to prepare a "working plan" for the development of the Endowment Fund.

Schlich Memorial Fund

The Sir William Schlich Memorial Fund was established in 1929 under the sponsorship of the Empire Forestry Association, London, England, in memory of the late Sir William, one time inspector general of forests in India and professor of forestry at Oxford University. Contributions were received from English speaking nations throughout the world, including the United States. Upon the establishment of the Fund, the Society of American Foresters was designated as custodian of the periodic grants that might be made to the United States.

The latest grant received by the Society from the fund is 55 pounds ($153.83). On a motion by Dr. Preston, seconded by Mr. Clark, the Council voted unanimously to apply this amount for the purchase of copies of the report on *Education in Forestry* which is currently approaching completion by the SAF project Study of Education in Forestry and Related Fields of Natural Resources, Samuel T. Dana, director.

Copies of the book, to be published late in 1961 or early in 1962, will then be sent to educational institutions offering forestry programs in the British Commonwealth nations.

Business Manager and Assistant Executive Secretary

President Connaughton reported progress in filling the positions of business manager and assistant executive secretary. Filling the former was made necessary by the retirement in 1961 of Miss L. A. Warren who has capably held the position since 1928. Selection of the two appointees was delegated by the Council to a special committee of SAF officers consisting of Mr. Connaughton, Mr. Malsberger, and Mr. Clepper.

The new business manager, appointed as of June 1, 1961, is Young W. Rainer, a professional forester and SAF member, who has had prior association experience with the Southern Pulpwood Conservation Association and American Forest Products Industries, Inc.

On a motion by Mr. Allen, seconded by Dr. Garratt, the Council adopted procedure for Mr. Rainer to succeed Miss Warren as assistant treasurer of the Society, as follows:

"As soon as feasible after June 1, 1961, but not later than August 31, 1961, Miss L. A. Warren shall relinquish the office of Assistant Treasurer. At the same time Mr. Young Rainer shall be appointed as an officer of the Society of American Foresters with the title of Assistant Treasurer, until such time as this authorization is rescinded, to serve in the absence of the Treasurer or in his inability to perform his duties as provided under Article VI, Section 5 of the Society's Constitution."

Mr. Connaughton further reported that announcement of the selection of the assistant executive secretary will be made later in the year.

Advertising Counsel

Lloyd Thorpe of Seattle, advertising representative of the JOURNAL OF FORESTRY since 1948, has notified the Society of his retirement in 1961. With the approval of President Connaughton, the executive secretary has engaged the services of Erle Kauffman as advertising counsel, effective July 1961.

Mr. Kauffman, former editor of *American Forests* magazine, is experienced in magazine advertising promotion. He will be a staff member of the executive office in Washington, D. C., working on the basis of two weeks in each month.

On a motion by Mr. Clark, seconded by Mr. Hagenstein, the Council unanimously commended Lloyd Thorpe for his advertising services to the JOURNAL OF FORESTRY, and directed that a special letter of appreciation be sent him.

How Many Foresters in U. S.?

A question frequently asked of the Society is the number of professional foresters in the United States who are practicing forestry or working in allied fields. In order to obtain this essential information, the Society will need the endorsement of the Council of Forestry School Executives and the cooperation of the forestry schools. To this end, a proposed procedure for conducting a survey of the number of professional foresters was worked up by F. H. Eyre of the SAF executive office.

On a motion by Dr. Garratt, seconded by Prof. Heiberg, the Council authorized the survey in accordance with Mr. Eyre's plan.

Journal of Forestry to Offer Additional Services

In response to the requests of many members for additional services to be provided by the JOURNAL OF FORESTRY, Arthur B. Meyer, editor, and Henry Clepper, executive secretary and managing editor, proposed three increases in the JOURNAL's editorial content. These are (1) a Letters to the Editor section; (2) an increase in the items published in the Forestry News section; and (3) a monthly two-page section to be devoted to timely reports on forestry issues and policies.

On a motion by Dr. Preston, seconded by Mr. Clark, a Letters to the Editor section was approved on a trial basis. Mr. Hagenstein suggested that the page be headed by a brief statement explaining that the section is to permit members to be articulate on professional matters and issues. Discretion as to material to be published will rest with the editor.

On a motion by Mr. Allen, seconded by Dr. Bramble, the editor was authorized to start on a trial basis a two-page section in the JOURNAL devoted to timely reports on forestry issues and policies, at a monthly cost of $100 for reportorial services, beginning with the July 1961 issue.

In considering these matters, the Council took note of proposals by sev-

eral Sections and individual members that the Society publish a special news magazine on forestry, and at the same time combine the JOURNAL OF FORESTRY and *Forest Science* on a publication schedule less frequent than monthly.

In order to express the Council's opinion of the various proposals made, and to combine these opinions in a statement of policy, Dr. Preston was requested to summarize them together with the foregoing approved motions. His statement, which follows, was unanimously adopted on his motion, seconded by Dr. Bramble.

"The Council is aware of the interest of the membership in improving communications through the Society's publications. It has considered suggestions presented by individuals and Sections and those discussed at the joint meetings with the Section delegates.

"The Council is convinced that the JOURNAL in its present form, which is in accord with Article IX of the Constitution, is the type of publication best qualified to advance the interests of the Society and the profession of forestry.

"However, to improve further the usefulness of the JOURNAL to the members, the Council authorized the following three additions:

"1. A Letters to the Editor section. Letters submitted to the editor should be directly related to professional matters; they should be constructive, and not libelous or defamatory; and they should be limited to 300 words.

"2. An increase in the items published in the Forestry News section. The editor is requested to try to obtain more news items from the Sections and Chapters.

"3. A two-page section devoted to timely reports on forestry policies and issues. This section shall be instituted on a trial basis.

"The Council is not at this time in favor of combining the JOURNAL OF FORESTRY and *Forest Science;* or of starting a separate news publication, which when attempted during the late 1940's did not prove feasible."

Biological Research Award

The Council committee set up to consider eligibles for SAF awards in recognition of outstanding achievement in basic or applied research in any branch of the biological sciences consists of K. P. Davis, chairman, S. O. Heiberg, and C. L. Tebbe. This committee presented its 1961 nominees to the Council in accordance with criteria and procedure previously established. (Reference: JOURNAL OF FORESTRY, February 1961, page 150.)

By written secret ballot the Council voted to make two awards for achievement in biological research at the dinner of the Society and the Canadian Institute of Forestry to be held in Minneapolis next October 11. In accordance with established custom the names of the recipients will not be divulged until the presentations are made.

Annual Meeting of 1961

A report by F. H. Kaufert, general chairman for the 1961 annual meeting in Minneapolis jointly with the Canadian Institute of Forestry, was read and accepted. An announcement of the schedule of events and the preliminary program will be published in July.

On a motion by Mr. Clark, seconded by Mr. Allen, the Council authorized an expenditure not to exceed $500 to help finance special features of the meeting.

As part of the customary Society Affairs session on October 9, to which CIF members are cordially invited, the Council again authorized a special program on the subject "Impact of Recreational Demands on Forests." The chairman of the Division of Recreation will be consulted as to the details of the program.

Council Action on Policy

The Columbia River Section adopted a resolution on April 23, 1960 entitled "Professional Responsibility." (Reference: JOURNAL OF FORESTRY, June 1960, page 499.) The purpose was to identify policy issues of professional importance, and obtain consideration of them at meetings of the Council and Sections, and subsequent action by the Council. This resolution, also endorsed by the Puget Sound, Kentucky-Tennessee, and Southeastern Sections, requested an amendment to the Bylaws to set up procedure to accomplish its aims.

The Constitution (Article X, Section 2) and Bylaw 53 place upon the Council the authority and responsibility for expressing the position or attitude of the Society on matters pertaining to its objectives. In its consideration of the Columbia River Section resolution, the Council decided that the matter was essentially a procedural one, not requiring a new bylaw.

Hence, on a motion by Dr. Davis, seconded by Mr. Hagenstein, the Council voted to authorize a Committee on Policy, composed of three Council members, to carry out the following procedure:

1. The Committee will solicit from the Sections issues and matters they would propose for action in the name of the Society.

2. The Committee may also propose policy issues on its own account.

3. The Committee will submit such issues and matters, deemed of sufficient national importance, to the Sections for discussion and, if applicable, for reports.

4. The Committee will provide for consideration of the most important matters at the annual joint conferences of the Section delegates and the Council.

5. When action is called for, the Council will arrrange for decision by one of the following means:

(a) Prompt Council vote.
(b) Council vote following an opinion poll of the Sections.
(c) Membership referendum.

6. To assure that this procedure would be workable, Section delegates, under (4) above, will have to be officially designated with authority to speak for their Sections on matters that had previously been decided by the Sections, either by vote or by authorized decision of their Executive Committees.

7. The joint Section delegates-Council meetings will be closed meetings with attendance and participation restricted to the Council and the official delegates or their official alternates.

President Connaughton appointed the following Council members to the Committee on Policy, to serve during the rest of 1961: Chairman G. A. Garratt, K. P. Davis, and W. D. Hagenstein.

Committee to Review Constitution and Bylaws

The Society's Constitution and Bylaws have been amended at various times during the past two decades. But during this period there has been no thorough study of all articles of the Constitution and all Bylaws, some of which are out of date and not wholly applicable in view of the Society's current operations and continuing growth.

Accordingly, on a motion by Mr. Hagenstein, seconded by Mr. Clark, the Council voted to authorize the President to appoint a committee, not to exceed seven members, to study the Constitution and Bylaws, and to make recommendations for revision where deemed necessary; and to report to the Council at its spring meeting in 1963.

The personnel of the Committee will be announced in a later issue of the JOURNAL.

Associate Member Grade

The Council Committee on Membership (B. E. Allen, chairman) has called

to the Council's notice certain inconsistencies in Bylaw 8 which defines the qualifications for the Associcate Member grade.

Bylaw 8 previously read as follows:

Requirements for Associate Membership. There shall be two alternate qualifications for Associate Membership.

Class *A*. Persons who have not professional forestry qualifications of Junior Members, but who otherwise qualify as scientists for a grade equivalent to Member, which is the conception of this grade. Scientists working in the field of forest products but whose training has not included a large enough field of forestry to qualify as Junior Members belong in this grade. This grade includes graduates of specialized curricula in wood utilization, pulp and paper manufacturing, logging engineering, or such specialized fields as range management or wildlife, or other specialties, if said persons are equipped as scientists with a professional education equivalent to that of Junior Members but in their own field, and whose activities are conducted in close relation with forestry or foresters, in case such specialized curricula are not accepted by the Council as giving full professional training in forestry, belong in this grade. The same is true of economists in such subjects as forest taxation, land utilization, and the lumber industry.

Class *B*. Persons who are not possessed of a scientific education and are not pursuing scientific activities, but who through their public activities in connection with forest economics and forest policy or their individual efforts along any line of forestry, public or private, such as outstanding success in private forest management, have shown that they understand the fundamental objectives and principles of forest economics, management, and technical practice, and whose services in these respects are recognized generally by members of the profession who would normally be expected to know of their activities, are eligible for this grade. The words "recognized by the profession generally" will be taken to mean that if the members of a Section generally recognize that these services have a value to the profession generally, that is, extending outside the boundaries of the Section, the individual is eligible, if approved by the Council. Persons of lesser merit should be associated not with the Society but only as associate members of a Section, when its bylaws provide for such a grade.

On a motion by Mr. Allen, seconded by Dr. Davis, the Council voted to amend Bylaw 8 as follows, effective as of this publication in the June issue of the JOURNAL.

Bylaw 8. Requirements for Associate Membership. There shall be two alternate qualifications for Assocciate Membership.

Class *A*. Persons who have not the professional forestry qualifications to be considered for Junior Membership, but who otherwise qualify as scientists (in fields related to the profession of forestry) for a grade equivalent to Member, is the conception of this grade. Applicants should have a college degree in their special field, have experience in scientific work for at least three years, and be engaged in such scientific work in their special field at the time of their application.

Scientists working in the field of forest products; graduates of specialized curricula in wood utilization, pulp and paper manufacturing, logging engineering, soils, range management, wildlife management, and other specialties; and economists actively practicing in the fields of forest taxation, land utilization, and the wood-using industries are examples of those who may qualify; provided, said persons are equipped as scientists with a professional education equivalent to the bachelor of science degree (or higher) in their fields, plus at least three (3) years' experience in scientific work in those special fields, and are actively engaged in those fields (with relation to the forestry profession) at the time of application.

Class *B*. Persons eligible for this grade are those who have had at least two (2) years of college training (or equivalent in formal education), who are not possessed of scientific education, and who are not pursuing scientific activities, but who through their activities in connection with forest economics, policy, management, utilization, research, or any related professional forestry specialty have shown and demonstrated by their actions, practices, and accomplishments that they understand the fundamental objectives, principles, and techniques of the practice of forestry.

In the case of either a Class *A* or a Class *B* applicant his services, attainments, and professional status shall be such as to be recognized generally by members of the forestry profession who would normally be expected to know of his activities. Recognition by the profession generally shall be construed by the Council to mean that the services and accomplishments of the applicant have a value to the profession of forestry extending outside the boundaries of the applicant's resident Section. Endorsements of applicants for this grade should be from members of the Society other than in the applicant's own immediate circle of professional affiliation. The endorsers' statements should categorically outline in detail and properly reflect the contributions made by the applicant generally to the profession.

Referendum on Membership

At the joint meeting of the Council and Section delegates, held in Washington, D. C. on November 13, 1960, a brief report was made on membership grades by B. E. Allen, chairman of the Council Committee on Membership. From his Committee's study of membership grades during 1960 he believes that the majority of members desire to combine the two grades of Junior Member and Member (formerly Senior Member). He recommended that a ballot be prepared for referendum by the voting membership in 1961.

In preparation for this referendum, coincidental with the 1961 biennial election, President Connaughton suggested that each Section and Chapter should discuss the several issues involved.

On a motion by Mr. Allen, seconded by Mr. Clark, the Council authorized a referendum on an amendment to the Constitution that would establish one grade of Member, eliminating the Junior Member and Member grades as now constituted.

The Constitution now defines the two grades as follows:

Article III, Section 5. "Junior Members shall be graduates of curricula approved by the Council in institutions accredited by the Council; or in lieu of such training they shall show proof that they have acquired a combination of technical experience and education sufficient for a professional career in forestry and equivalent to the training given in an approved curriculum in an institution accredited by the Council."

Article III, Section 6. "Members shall be elected from the Junior Members and shall have had at least three years' experience in forestry subsequent to the date they met the requirements for Junior Membership. Advancement to Member shall indicate that in the opinion of the Council the candidate is possessed of both the requisite theoretical and practical experience and has demonstrated his acceptance of such standards of professional conduct and character as to justify the Society in accepting him as competent to represent the profession honorably and capably in the performance of his duties. Members shall be engaged in forestry work at the time of election."

Ballots on this proposed amendment of the Constitution will be submitted to the voting membership in October.

Election of Fellows

The Council has received a resolution from the Southeastern Section requesting a study of all aspects of the election of Fellows with a view toward revising the procedure. The Council also noted that a special committee under the chairmanship of Council Member J. S. Illick had made an intensive study of the election of Fellows in 1955. This committee's report was published in the JOURNAL OF FORESTRY for June, 1956, pages 410-414. It resulted in the addition to the board of electors of the chairmen of the Society's 22 Sections and 10 subject Divisions, and a reduction in the number of votes necessary to elect from two-thirds of the number of total votes cast, to not less than 50 percent of the total number of votes cast. This change was effective with the election of 1957. As only one additional biennial election (1959) has been held since that year it was deemed desirable to observe the results of one more

election before considering further changes.

Accordingly, on a motion by Mr. Clark, seconded by Mr. Allen, the executive secretary was instructed to make a thorough analysis of the results of the three Fellow elections of 1957, 1959, and 1961, and to report to the Council at its spring 1962 meeting.

Division Meetings

At the Council meeting held May 8 and 9, 1960, D. E. Clark and W. D. Hagenstein were designated as a Council committee of two to observe the operations and programs of the Division meetings held in Washington, D. C. last November. Following presentation of their preliminary report to the Council, they were requested to observe the Division meetings again in October 1961 at Minneapolis.

Meanwhile, their report will be made available to the Society's Planning Committee (Lee James, chairman). In addition, a special letter to all Division officers will be prepared by Mr. Clark and Mr. Hagenstein. The purpose of this letter will be to suggest improvements in the conduct and programming of Division meetings.

Referendum on Wilderness

Mr. Hagenstein proposed that the Society hold a referendum on the principle of whether wilderness areas should be established by Congressional legislation. Discussion by the Council indicated that it would be professionally desirable to invite the voting membership to express an opinion on this controversial issue.

Notice was taken of the Counucil policy on wilderness adopted in 1958, and reaffirmed May 10, 1960, as follows:

"The Council of the Society of American Foresters reaffirms its support of the concept of multiple use of forest and other wild lands, as approved by referendum of the membership in 1947. The Council believes that wilderness is a proper part of a program of multiple use for public lands. Furthermore, the Council believes that the determination of areas suitable for wilderness and the boundaries thereof are responsibilities and functions of the personnel charged with administration of these lands."

On a motion by Prof. Heiberg, seconded by Dr. Preston, the Council voted unanimously to rescind the 1960 policy on wilderness.

Following this action, Mr. Hagenstein made a motion, seconded by Dr. Bramble, that the executive secretary shall develop a suitable form of referendum on wilderness for the consideration of the Council and subsequent submission to the voting membership. This motion was unanimously approved.

The executive secretary was further instructed to obtain and publish in the JOURNAL two articles—one *pro* and one *con*——on the subject of wilderness legislation, prior to the mailing of the ballots.

Study of Education

A written progress report on the Study of Education in Forestry and Related Fields of Natural Resources Management was submitted to the Council by S. T. Dana, director. The typescript of the book is ready for duplication and distribution to the steering committee and to other individuals whose criticism is desired. Dr. Dana estimates that the typescript will be ready to go to the printer next fall and that the book should be off the press early in 1962.

In addition to the foregoing progress report, Dr. Dana made available to the Council the final chapter, "Conclusions and Recommendations," which was discussed at length.

This project was undertaken by the Society and was supported by an initial grant of $39,500 from the Old Dominion Foundation.

Committee Chairmen for 1962 Annual Meeting

The 1962 annual meeting will be held in Atlanta, Georgia, October 21-24.

With the approval of the Council, President Connaughton designated the following members to serve in the following major assignments:

James K. Vessey, general chairman.

Donald D. Stevenson, chairman of the Program Committee.

Douglas A. Craig, chairman of the Committee on Arrangements.

Proposed Professional Study of Small Forest Ownership

On a motion by Mr. Hagenstein, seconded by Dr. Bramble, the Council authorized the appointment of a committee of Council members to consider the feasibility of a professional study by the Society of small forest ownership.

Designated by President Connaughton to serve on the committee are Mr. Allen, chairman, Dr. Bramble, and Dr. Davis.

Income from Patents

E. A. Foster, a consulting forester of Lakeland, Fla., and an SAF Member, has proposed, under certain conditions, to assign to the Society a percentage of anticipated income from forestry equipment patented by him.

On a motion by Mr. Allen, seconded by Mr. Clark, the Counucil thanked Mr. Foster for his generous offer and directed that any funds that might accrue be deposited in the Endowment Fund, with the provision that the Society shall not be obligated or liable for future defense of the patents by litigation.

Report on Communications

A special committee, authorized by the Council in 1960 to study Society communications, has completed its report. Chairman D. E. Clark has arranged for copies of the report to be made available to all Sections and Chapters. It contains in condensed form most of the ideas passed on to the committee, as a result of the chairman's request for suggestions.

Obsolete Policy Statements

At the Council meeting, held May 9 and 10, 1960, Prof. Heiberg was designated to review the Society's existing policy statements with a view to the elimination of those that are obsolete. Eight policies were identified by Prof. Heiberg as being in that category.

Accordingly, on a motion by Mr. Allen, seconded by Dr. Garratt, the eight policy statements, named hereafter, were declared obsolete and therefore void, unless the action is questioned in which case the policy would be reconsidered.

1. Letter from the SAF President to U. S. Civil Service Commission emphasizing educational qualifications for professional positions. (Reference: JOURNAL OF FORESTRY, March 1945, page 232.)

2. Expression of opposition to the McCarran Bill leveled at federal grazing administration in general. (Reference: JOURNAL OF FORESTRY, April 1947, page 303.)

3. Expression of support of a three-point program to relieve the pressing situation in the Superior National Forest in Minnesota. (Reference: JOURNAL OF FORESTRY, March 1947, page 224.)

4. Remittance of unpaid dues provided application received prior to December 31, 1955. (Reference: JOURNAL OF FORESTRY, January 1955, page 55.)

5. Special Committee on Tree Names. (Reference: JOURNAL OF FORESTRY, January 1956, page 63.)

6. Special request to Division of Public Relations. (Reference: JOURNAL OF FORESTRY, August 1955, page 607.)

7. Special committee on legislation. (Reference: JOURNAL OF FORESTRY, August 1955, page 606.)

8. Soliciting recommendations from Division of Private Forestry on licens-

ing of foresters. (Reference: Minutes, Council Meeting, April 1947.)

Miscellaneous

Dr. Garratt reported on the grant of $10,000 received by the Society from the National Science Foundation to help defray the travel expenses of selected forester-scientists to the conference of the International Union of Forest Research Organizations in Vienna next September. (Reference: JOURNAL OF FORESTRY, May 1961, page 388.)

On a motion by Prof. Heiberg, seconded by Dr. Preston, the Council authorized the executive secretary to continue a contract with the International Cooperation Administration, an agency of the U. S. Department of State, whereby subscriptions to the JOURNAL OF FORESTRY are made available to Corresponding Members in certain foreign nations, partly at government expense.

Arthur B. Meyer, editor of the JOURNAL, submitted to the Council the outline of a special issue of the JOURNAL to be devoted to the subject of animal damage to forests. It will appear in January 1962.

At the suggestion of President Connaughton, the Council instructed the executive secretary to verify the availability of all meeting and conference rooms required for the 1964 annual meeting, scheduled to be held in Spokane, Wash., October 11-14.

Fifth Call for Council Nominations

All members are hereby notified that the regular biennial election will be held December 2, 1961. A president, vice president, and nine other members of the Council will be elected for the two-year term 1962-1963.

The present Council is listed in the box on page 463. Any or all of these incumbents may be renominated, provided they accept the nomination in writing.

Membership on the Council is restricted by the Constitution to Members (formerly Senior Members) and Fellows. Any Member or Fellow is eligible to hold office who is in good standing and who accepts the nomination in writing and declares his willingness to serve if elected.

Each voter will have an opportunity to ballot on all candidates for office. Council members are elected in accordance with the system of proportional representation. The procedure of proportional representation will be explained in a later issue of the JOURNAL. It is the system by which the Society has been electing Council members for more than two decades.

Candidates for the office of president are voted on separately; the candidate who receives the highest vote is declared elected president, and the candidate who receives the next highest vote is declared elected vice president. Thus all candidates for president are considered as nominated also for vice president.

How Nominations Are Made

The Constitution (Article VIII, Section 2) states the conditions under which nominations are made by petition.

1. Each petition shall name but one candidate.

2. All candidates must be eligible to hold elective office.

3. A petition shall bear the signatures of at least ten voting members who at the time of signing the petition are eligible to vote in the coming election. (Eligible voting members are Junior Members, Members, and Fellows in good standing.)

4. A voting member may not sign more than one nominating petition for president or more than one nominating petition for a member of the Council. That is, he may sign two, but no more.

5. Petitions must be in the Society office by September 16, 1961.

The Society has no special form for submitting nominating petitions. They may be written as follows:

We, the undersigned voting members of the Society of American Foresters, hereby nominate John Doe, a Member (or Fellow) for the office of president (or member of the Council) for the two-year term 1962-1963.

The form of acceptance of a nomination may read as folows:

I accept the nomination to the office of President (or to membership on the Council) of the Society of American Foresters for the two-year term 1962-1963, and agree to serve if elected.

No nomination will be considered valid unless supported by the nominee's acceptance in writing which should be attached to the nominating petition.

All nominating petitions should be sent promptly to the Society office, 425 Mills Building, 17th Street at Pennsylvania Avenue, N. W., Washington 6, D. C. The executive secretary will gladly provide information about nominating or election procedure.

According to the Constitution (Article VIII, Section 1) a Nominating Committee has been appointed by President Connaughton.

This committee is charged with the following duties:

1. To set the date of the election. (December 2, 1961, is the date.)

2. To provide for at least two candidates for the office of president, and at least nine candidates for membership on the Council.

3. To receive separate nominating petitions for the office of president and for each member of the Council, and to supplement such petitions when necessary with other nominations in order to comply with item 2 above.

The Nominating Committee will make no nominations of its own unless the voting membership fails to make the required minimum number of nominations by petition. Voting members should accordingly get busy and make their own nominations. For their information the distribution of Council members by states during the period 1946-1961 is shown in Table 1, page 143, February issue.

Nominations Received

On the date of going to press the following nominations had been received:

For President

B. E. Allen, Savannah, Ga. (Council Member 1956-1957, 1958-1959, 1960-1961.)

Paul M. Dunn, New York, N. Y. (Council Member 1946-1947, 1948-1949.)

J. Herbert Stone, Portland, Ore. (Council Member 1954-1955, 1956-1957, 1958-1959.)

For the Council

William C. Bramble, Lafayette, Ind. (Council Member 1960-1961.)

Donald E. Clark, Denver, Colo. (Council Member 1958-1959, 1960-1961.)

Robert H. Clark, Fordyce, Ark.

George W. Dean, Charlottesville, Va.

F. T. Frederickson, International Falls, Minn.

W. D. Hagenstein, Portland, Ore. (Council Member 1958-1959, 1960-1961.)

Svend O. Heiberg, Syracuse, N. Y. (Council Member 1960-1961.)

George M. Jemison, Washington, D. C.

Dahl J. Kirkpatrick, Albuquerque, N. Mex.

Charles H. Lewis, Jr., Alexandria, La.

William A. Parr, Bel Air, Md.

Archie E. Patterson, Athens, Ga.

Burnett H. Payne, San Francisco, Calif.

Richard J. Preston, Jr., Raleigh, N.C. (Council Member 1960-1961.)

John F. Shanklin, Washington, D C.

Eugene V. Zumwalt, Washington, D. C.

SETH G. HOBART, *Chairman*
Nominating Committee

Fifth Call for Fellow Nominations

All members (formerly Senior Members) and Fellows of the Society are hereby advised that nominations for the grade of Fellow are now open. The election of Fellows will be held at the time of the Society's regular biennial election, December 2, 1961.

As defined by the Constitution (Article III, Section 7), "Fellows shall be foresters recognized generally throughout the profession as persons who have rendered outstanding service to forestry and to the Society. They shall be elected from the Members."

Nominations by Petition

The procedure for placing Members in nomination for the grade of Fellow is by petition. The Society has no printed form for this purpose; the petition may be typewritten thus:

We, the undersigned Members and Fellows of the Society of American Foresters hereby nominate John Doe for election to the grade of Fellow in 1961.

Remember these simple rules:

1. A petition may not name more than one nominee.

2. It must be signed by not less than 25 Members or Fellows in good standing.

3. It must be accompanied by a factual, not eulogistic, biographical sketch of at least 300 words giving an account of the nominee's professional career and accomplishments.

4. It must be received in the executive office of the Society, 425 Mills Building, 17th Street at Pennsylvania Avenue, N.W., Washington 6, D. C., not later than September 16, 1961.

The executive employees of the Society cannot be responsible for obtaining signatures on partially completed petitions or on petitions incomplete by reason of unacceptable signatures (that is, signatures of other than Members and Fellows in good standing). Only those nominees' names will appear on the ballot whose petitions are complete and valid in all details as of September 16, the closing date.

Election Procedure

Fellows are not elected by the membership at large, but by a board of electors which consists of all present Fellows, the Council, the chairmen of the 22 Sections, and the chairmen of the 10 subject Divisions.

The system is described in Article IV, Section 4 of the Constitution. To win election a nominee must receive an affirmative vote of not less than one-half the total number of votes cast, as provided in Bylaw 11.

For the 1961 election there will be 135 electors, of whom 94 are Fellows. An elector has one vote only. Thus, a Fellow who is also a Council member has but one vote.

Significance of the Grade

The highest membership distinction that can be conferred by the Society, this grade is awarded in recognition of outstanding service to forestry and to the Society. Fellows do not pay increased dues; their dues are the same as those of Members.

Since the Society was founded in 1900, there have been 125 Fellows elected. At the present time the number of living Fellows is 94.

The current roster of Fellows appeared in the May issue, page 386.

Nominations Received

On the date of going to press the following nominations for Fellow had been received:

Frank A. Albert, Jacksonville, Fla.

Robert S. Campbell, New Orleans, La.

Walter H. Horning, Washington, D. C.

George M. Jemison, Washington, D. C.

Fred H. Lang, Little Rock, Ark.

Ira J. Mason, Bethesda, Md.

William M. Oettmeier, Fargo, Ga.

George R. Phillips, Chevy Chase, Md.

A. B. Recknagel, Ithaca, N. Y.

John F. Shanklin, Washington, D. C.

Allen E. Thompson, Seattle, Wash.

Arthur T. Upson, Tucson, Ariz.

George O. White, Jefferson City, Mo.

Council's Column

More and the Fifth Year

I was very much interested in Professor Heiberg's views in the March "Council's Column" on Dean Dana's proposal that a fifth year be added to the undergraduate education of foresters. I agree with his conclusion and that of Dean Dana that such a fifth year should be given serious and favorable consideration promptly by the forestry education profession. Likewise, with the completion of Dean Dana's study and report it should be given similar consideration by the Society in its requirements for professional accreditation. Employers of foresters also had better be looking to the forestry job ahead in terms of the added needed educational requirements.

Time, in its issue of April 7, quotes M.I.T. President Julius A. Stratton as stating: "The world into which we were born is gone; we have little or no idea of the world into which our children may grow to maturity. It is the rate of change, even more than the change itself, that I see as the dominant fact of our time." If such be the case, how do we approach the intricate task of adding effectively to the undergraduate curriculum?

President Stratton says: "Science and engineering no longer can be taken in isolation from the rest of the problems of our society—they are woven in the whole fabric of our industry, economy and federal life." Chief Forester McArdle, in speaking on "Forestry's Expanding Horizons" at the 60th Annual Meeting of the Society stated that "the basic question is not how restricted our horizons may be but how far will we stretch ourselves to reach the unlimited horizons that do lie ahead." He emphasized the increasing importance of dealing with people as well as trees, that our mission is social as well as economic and silvicultural, that forestry is more than trees; it is becoming increasingly the management of forest lands in terms of all the products and services forests can produce and including public understanding that such is the case.

There seems to be agreement among leaders looking ahead that broadening of our educational horizons must include greater attention to the humanities and to political science if foresters, engineers, scientists, are to meet their opportunities in the challenge of a rapidly changing world. The techni-

cal requirements of the job will become higher. To put them to most useful purpose however will require foresters sensitive to and capable in the changing world. Recognition of this requirement should furnish the base from which we as foresters, educators, employers, the Society, may well proceed in figuring what may be included in the Fifth Year.

This is not to suggest that undergraduate education will produce in the forester the "full man." It is to suggest that undergraduate education can provide a foundation for him and to him an appreciation for becoming one.

DONALD E. CLARK

Wisconsin-Michigan Section Officers

By mail ballot the Wisconsin-Michigan Section has recently elected new officers as follows:

Chairman—Kenneth P. Davis, University of Michigan, Ann Arbor.

Vice Chairman—B. M. Stout, U. S. Forest Service, Carpenter Bldg., 710 North 6th St., Milwaukee 3, Wis.

Secretary-Treasurer—R. L. Olmstead, Department of Conservation, 408 Kalamazoo Plaza, Lansing 33, Mich.

New England Section Meets

The 41st annual winter meeting of the New England Section was held at the Hotel Somerset, Boston, March 16-17. The meeting had two sessions operating simultaneously, with one on the general theme "Needed: A Blueprint for the Future of New England Forests"; and the other consisting of papers for the practicing forester which included "Converting Hardwoods to Conifers;" the establishment of softwood stands; and lumber marketing research. Arnold Rhodes of the University of Massachusetts was program chairman for the meeting.

New officers installed at the meeting were Bertram Husch of the University of New Hampshire, chairman; Robert M. True of the S. D. Warren Co., Cumberland Mills, Maine, vice-chairman; and Raymond T. Foulds, Jr., 393 South Prospect Street, Burlington, Vt., secretary-treasurer.

The Section went on record as favoring the present legislation in Congress calling for a National Seaside Park on Cape Cod.

A resolution was passed calling for Section operating committees to submit to the Executive Committee budgets for an improved program of Section activities, with emphasis on good publicity for the work of the Section and the accomplishments of the forestry profession. The Executive Committee will submit a revised budget to the Section at the summer meeting with a recommendation for an increase in Section dues if necessary.

The summer meeting is to be held at the Tree Farm of J. Harry Rich in Middlesex, Mass., probably during the last week in August.

The 1962 winter meeting was scheduled for March 15-16, 1962, at the Hotel Statler-Hilton in Boston.

A total of 243 foresters registered for the meeting; 135 foresters and ladies attended the banquet, which featured Maurice Goddard of the Pennsylvania Department of Forests and Waters as principal speaker. Mr. Goddard described the recent growth of the forestry program in his state.

Retiring chairman of the Section is Fred E. Holt, Deputy Forest Commissioner for Maine.

The Executive Committee voted against the idea of a news section in the JOURNAL OF FORESTRY; and instead voted to send a copy of the Section News Quarterly to the editor of the JOURNAL. The Committee voted to purchase 200 copies of the Society's guidance booklet, and to distribute these through the Chapters with the supervision of the Section Executive Committee members in the states and provinces.

R. T. FOULDS, JR.
Secretary-Treasurer

New York Section Holds Annual Meeting in Syracuse

The annual meeting of the New York Section was held April 11 and 12 in Syracuse during the period of the 50th anniversary of the College of Forestry.

At the Section's dinner, held in Sheraton Inn, David B. Cook presided as toastmaster. More than 100 members and ladies attended. The banquet speaker was William Roden, president of the State Conservation Council.

Edward J. Whalen, chairman of the Section, presided at the business meeting. Among the committee reports presented were those by C. Eugene Farnsworth, secretary-treasurer; S. O. Heiberg, on state registration and licensing; A. B. Recknagel, on policy and legislation; Stanley W. Hamilton, on publicity; Lawrence S. Hamilton, on membership; and Henry Clepper, SAF executive secretary, on national affairs. Robert R. Morrow gave a special report on research.

The fall meeting of the Section is planned for the Jamestown, N. Y., area in September.

Dues Deadline June 30

Members whose 1961 dues are not paid by June 30 will be declared in bad standing. They will no longer receive copies of the JOURNAL OF FORESTRY, be eligible as a candidate for office, or be permitted to vote. Pay your 1961 dues now so that you will continue to receive these, and other membership benefits.

Joint Meeting of SCS, SRM, and Intermountain Section

A joint meeting of the Soil Conservation Society, the Society of Range Management, and the Intermountain Section of the SAF was held at Utah State University, Logan, April 8.

The meeting was opened by Professon Arthur Smith, of Utah State University, who introduced the three speakers.

C. W. Townsend, assistant state conservationist, SCS, warned that urban sprawl is growing in Utah. About half the people in the state now live in urban areas, and the nonfarm majority will soon control and direct rural affairs. He suggested area planning as a solution to some problems, but said it relies on a well educated public.

Duane Lloyd, Agricultural Research Service, said that the importance of range land in livestock production is decreasing and the western range is in a steadily declining comparative position. He noted an increasing trend for sales of private range land for home site use and on increasing pressure for changes in federal land use. The current question is, "Are we going to run our stockmen off the range?"

Henry Ketchie, Dixie National Forest, stated that water is the most important resource on the Intermountain forests and that it is a limiting factor in the growth of industry here. He cautioned that it is impossible to assign each acre a use or to provide all uses on each acre, but that multiple use guides might be a solution to some problems.

A panel consisting of Allen Stokes, William Rozynek, Jack Berryman, Richard Murdock, and John Beyers discussed possible solutions for the problems raised by the speakers. They suggested that an informed public could find solution to its problems

through zoning and planning for multiple use management. There was some discussion about whether forest area zoning should be based on esthetic or economic value.

ALVIN K. WILSON
Secretary-Treasurer

Registration Fails in Minnesota

For the second time, a bill providing for registration of foresters failed to pass the Minnesota legislature.

Minnesota's most recent effort was a permissive bill. The bill introduced this session was one resulting from modifications made in an attempt to eliminate objectionable portions of an earlier mandatory bill which failed to pass the 1959 legislature.

Once again, visible opposition to registration of foresters came from a union of state, county and municipal employees and the Minnesota State Conservation Department Policy Committee.

At this time it is not known if another attempt will be made to introduce legislation of this type in 1963.

ARTHUR F. ENNIS, *Chairman,*
Professional Status Committee,
Upper Mississippi Valley Section,
Society of American Foresters

E. J. Fortenberry (1906-1961)

E. J. Fortenberry, 54, a veteran of 30 years service with the U. S. Forest Service and director of information and education of the Intermountain Region at Ogden, died in Denver, Colo., March 29, 1961.

Born in Kentwood, Louisiana, September 1, 1906, Mr. Fortenberry was a graduate of Louisiana State University in 1931 with a B.S. degree in forestry. In 1934 he served as junior forester on the Black Hills National Forest and later with the C.C.C. program. Subsequent positions included district ranger on the Rio Grande and Roosevelt National Forests, and assistant supervisor of the Gunnison National forest, all in Colorado. In 1951 Mr. Fortenberry became supervisor of the Medicine Bow National Forest in Wyoming and six years later was assigned to the regional office in Denver where he served until his promotion to Ogden.

Mr. Fortenberry was a member of the Society of American Foresters.

Arthur F. C. Hoffman (1888-1961)

Arthur F. C. Hoffman, 72, employed by the U. S. Forest Service for 37 years until his retirement in 1948, died in Denver, Colo., March 15, 1961.

Born in Des Moines, Iowa, April 6, 1888, he was graduated from Iowa State College in 1911 with a B.S. degree in forestry. He entered the Forest Service in 1911 and served on the San Juan, Old Montezuma, Rio Grande, and Black Hills Forests.

Mr. Hoffman became a member of the Society of American Foresters in 1916.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of April are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of June 30, 1961.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Alaska Section

Junior Grade

Atwood, D. G., Forester, USFS, Sitka, Alaska. W. Va. Univ., BSF, 1959.

Allegheny Section

Student Grade

PENNSYLVANIA STATE UNIVERSITY
Beans, L. B. Wilson, D. E.

WEST VIRGINIA UNIVERSITY
Trammell, C. T.

Junior Grade

Sheay, R. J., Ass't. Forester, State of N. J., Trenton, N. J. (Reinstatement).

Appalachian Section

Member Grade

Langdon, O. G., Project Leader, S. E. Forest Expt. Sta., Charleston, S. C. (Reinstatement).

Senter, E. E., Cons. Forester, W. Va. Pulp & Paper Co., Covington, Va. State Univ. N. Y., BSF, 1951 (Junior 1956).

Central Rocky Mountain Section

Student Grade

COLORADO STATE UNIVERSITY
Steppuhn, H. W.

Junior Grade

Hillis, J. R., Ass't. Dist. Ranger, USFS, Rapid City, S. D. State Univ. N. Y., BSF, 1960.

Lewis, R. D., Forester, USFS, Colorado Springs, Colo. Colo. State, BSF, 1956.

Affiliate Grade

Trekell, E. R., Ass't. Ranger, USFS, Colorado Springs, Colo.

Columbia River Section

Member Grade

Deckebach, F. G., Forester, Crown Zellerbach Corp., Astoria, Ore. (Junior 1954).

Erickson, D. W., Forester, Bureau of Land Mgmt., Baker, Ore. (Junior 1953).

Graham, R. L., Forester, Wallowa Tbr. Co., Kinzua, Ore. (Junior 1954).

Harris, W. O., County Surveyor, Union County, Pendleton, Ore. (49R55).

Horak, F. J., 1032 W. Nebo, Roseburg, Ore. (Junior 1951).

Knight, C. R., Forester, Bureau of Land Mgmt., Coos Bay, Ore. State Univ. N. Y., BSF, 1956 (Junior 1956).

Schmeckpeper, T. G., Ass't Ranger, USFS, La Grande, Ore. (Junior 1953).

Simons, L. A., Ranger, USFS, Burns, Ore. (51R55).

Tagawa, T. K., Dist. Forester, Oahu-Molokai Dist., Honolulu, Hawaii (Junior 1954).

Thomasson, G. S., Tbr. Cruiser, Roseburg Lbr. Co., Roseburg, Ore. (Junior 1951).

Thomson, A. P., 1555 N. W. Almond Ave., Roseburg, Ore. (Junior 1954).

Affiliate Grade

Murray, B. R., Forester, USFS, Tiller, Ore.

Gulf States Section

Junior Grade

Beacom, W. A., International Paper Co., Pineville, La. (Reinstatement).

Martin, G. E., Dist. Forester, Southland Paper Mills, Inc., Lufkin, Texas (Affiliate 1957).

Member Grade

Douglas, C. R., Dist. Forester, Champion Paper & Fibre Co., Livingston, Texas. Duke Univ., MF, 1956 (Junior 1956).

Johnson, R. A., Forester, USDA, Natchitoches, La. (Junior 1954).

Kirby, J. O., Forester, USFS, Meadville, Miss. Univ. Mich., BSF, 1933 (36R55).

Affiliate Grade

Byrd, D. O., Area Forester, Crown Zellerbach Corp., Walker, La.

Freshour, M. G., Forester, USFS, San Augustine, Texas.

Associate Grade

Bowers, E. J., Head Surveyor, Southland Paper Mills, Inc., Lufkin, Texas.

Inland Empire Section

Student Grade

UNIVERSITY OF IDAHO
Argyle, J. D. Beier, R. J.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF IDAHO
Lund, R. H. Ness, D. D.

Intermountain Section

Associate Grade

Cronkhite, E. R., Recreation Park Planner, Nevada State Park Comm., Carson City, Nev.

New England Section

Student Grade

UNIVERSITY OF MAINE
Berchet, D. G. Cahoon, D. M.
Hitchen, J. R.

Junior Grade

Banusevich, F. J., Forester, USFS, Middlebury, Vt. (Reinstatement).

New York Section

Student Grade

STATE UNIVERSITY OF NEW YORK
Freer, S. L.

Junior Grade

Anderson, D. G., Instructor, N. Y. State Ranger School Wanakena, N. Y. State Univ. N. Y., BSF, 1953.
Carota, N., Miner Institute, Chazy, N. Y. (Reinstatement).
Decker, H. V., Forester, N. Y. State Cons. Dept., Homer, N. Y. (Reinstatement).

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA
Merrill, P. D. Sanders, D. J.

Junior Grade

Fry, F. L., USFS, McCloud, Calif. (Reinstatement).

Member Grade

Glain, G. N., Tbr. Mgmt. Ass't., USFS, Happy Camp, Calif. Univ. Minn., BSF, 1956 (Junior 1956).

Affiliate Grade

Prack, P. A., Unit Forester, Simpson Tbr. Co., Korbel, Calif.
Roether, G. A., Forester, USFS, Eureka, Calif.

Northern Rocky Mountain Section

Junior Grade

Carty, D. M., Teaching Ass't., Mont. State Univ., Missoula, Mont. Mont. State Univ., BSF, 1960.

Member Grade

Johnson, R. F., Forester, U. S. Dept. of Interior, Missoula, Mont. Mont. State Univ., BSF, 1956.

Ozark Section

Student Grade

UNIVERSITY OF MISSOURI
Gourley, E. L. Myers, J. K.

Junior Grade

Purvis, C. T., Dist. Forester, Ark. State Forestry Comm., Jonesboro, Ark. (Affiliate 1957).

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI
Johnsey, R. L. Naland, P. R.

Puget Sound Section

Student Grade

UNIVERSITY OF WASHINGTON
Heilman, P. E.

Junior Grade

Boring, W. R., Dist. Ranger, USFS, Winthrop, Wash. (Reinstatement).
Wheat, J. G., Research Forester, Col. W. B. Greeley Forest Nursery, Nisqually, Wash. Iowa State Univ., BSF, 1949.

Southeastern Section

Student Grade

UNIVERSITY OF FLORIDA
Whitener, R. C.

UNIVERSITY OF GEORGIA
Kinard, F. W. Renegar, G. L.
Morton, W. R. Weese, G. K.

Junior Grade

Sykes, G. P., Circle Forester, Union Bag-Camp Paper Corp., Baxley, Ga. Univ. Ga., BSF, 1960.

Member Grade

Batemen, W. R., P. O. Box 486, Bay Minette, Ala. (Junior 1954).

Southern California Section

Junior Grade

Arndt, A. M., Senior Deputy Forester, Los Angeles County Dept. of Forester & Fire Warden, Los Angeles, Calif. (Af52R60).
Gulick, M. J., Ass't. Dist. Ranger, USFS, Fawnskin, Calif. Iowa State Univ., BSF, 1952.

Upper Mississippi Valley Section

Student Grade

IOWA STATE UNIVERSITY
Bolinger, D. M.
UNIVERSITY OF MINNESOTA
Swendner, L. J.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF MINNESOTA
Koenigs, D. R. Morton, H. L.
LeBarron, W. W. Nickless, H. R.
Smith, P. F.

Associate Grade

Graham, B. F., Ass't. Prof. of Biology, Grinnell College, Grinnell, Iowa.

Wisconsin-Michigan Section

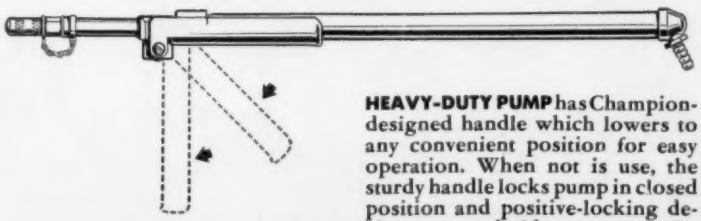
Student Grade

UNIVERSITY OF MICHIGAN
Baughman, W. D.

Junior Grade

Dawson, D. H., Plant Materials Tech., Soil Cons. Service, East Lansing, Mich. Mich. State Univ., BSF, 1948.

CHAMPION slide pump makes "a little spray go a long way" on a fire-fighting job



HEAVY-DUTY PUMP has Champion-designed handle which lowers to any convenient position for easy operation. When not is use, the sturdy handle locks pump in closed position and positive-locking device on cover holds pump securely. Pump is brass throughout with non-corroding, self-cleaning bronze ball valves.

ADVANCED-DESIGNED TANK is also built for dependable performance. Important feature is attachment of hose at top of tank to prevent water leaking when pump is below bottom of tank. Large filler opening has leak-proof cover with non-freeze gasket; locks securely, no threads to wear. Tank holds up to 5 gallons.

VENTILATED BACK is form-fitting and, providing air circulation between tank and operator's back, guards against discomfort. Wide, adjustable straps make it easy to carry as knapsack.

Piston-type pump also available. Write for literature on both models. Distributor inquiries invited.

CHAMPION SPRAYER COMPANY
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Forestry News

New York College of Forestry Observes Golden Anniversary

More than one thousand alumni, faculty, trustees, and guests attended the 50th anniversary of the State University of New York College of Forestry, at Syracuse, April 12, 13, and 14, 1961.

On the opening day there was a dedication of the H. P. Brown wood collection, followed by a reception in Marshall Hall. Class reunions and dinners were held that evening.

At the general session on April 13, of which Joseph E. McCaffrey, vice president of International Paper Company, served as chairman, three keynote speakers discussed the general topic "Challenges of Forestry." They were Richard E. McArdle, chief of the U. S. Forest Service; Howard W. Morgan, director of Weyerhaeuser Company and vice president of its pulp, paperboard, and container group; and Henry Vaux, dean of the University of California School of Forestry.

An afternoon symposium, consisting of four sessions, was devoted to the subject of "challenges"—to the use of forest resources, forest production, new wood uses, and fibers and molecules.

Among the speakers on forest resources who are well known throughout the forestry profession were Conrad L. Wirth, director of the National Park Service; Laurance S. Rockefeller, chairman of the Outdoor Recreation Review Committee; William A. Duerr, chairman of the College of Forestry Department of Forestry Economics; Harold G. Wilm, conservation commissioner of New York State whose paper was read *in absentia*; and John Buckley of the U. S. Fish and Wildlife Service.

Speakers on the panel on forest production were Philip A. Briegleb, director of the Southern Forest Experiment Station; Theodore T. Kozlowski of the University of Wisconsin; Leon S. Minckler of the Central States Forest Experiment Station; Donald P. White of Michigan State University; and Theodore W. Earle, vice president of woodlands for Continental Can Company.

Among those on the panel on new wood uses were E. S. Harrar, dean of Duke University School of Forestry; James S. Bethel of the National Science Foundation; and Herbert B. McKean, director of research for Potlatch Forests, Inc.

The golden anniversary dinner was held in the Hotel Syracuse. Addresses were given by William P. Tolley, chancellor of Syracuse University, and by Thomas H. Hamilton, president of the State University of New York.

Dean Hardy L. Shirley and President Hamilton conferred seven fiftieth anniversary distinguished service medals. Recipients were: Irvine T. Haig, George A. Hunt, Frank H. Kaufert, Herman F. Mark, Richard E. McArdle, Eino A. Saari, and Conrad L. Wirth.

An academic convocation started the final three-day celebration. Following a tribute to the College of Forestry by Chancellor Tolley, two addresses were given. The first "Challenges in World Forestry" was by Eino Saari, professor of forestry economics at the University of Helsinki; the second "Reaching Toward the Future," by Dean H. L. Shirley.

Honorary doctoral (Science and Law) degrees were conferred on Laurance S. Rockefeller, National Outdoor Recreation Review Commission; Irving W. Bailey, Harvard University; Howard W. Morgan, Weyerhaeuser Company; Richard E. McArdle, U. S. Forest Service; Eino A. Saari, University of Helsinki; and Ellwood S. Harrar, Duke University School of Forestry.

Numerous exhibits, especially set up for the occasion, illustrated the many services and educational fields offered by the College.

RECIPIENTS of honorary degrees: *L* to *R*, Howard Morgan, Weyerhaeuser Company; Irving W. Bailey, Harvard University; Ellwood S. Harrar, School of Forestry, Duke University; Eino A. Saari, University of Helsinki (Finland); Laurance S. Rockefeller, National Outdoor Recreation Review Commission; and Richard E. McArdle, U. S. Forest Service.

GENERAL SESSION. Theme: "Challenges of Forestry." *L* to *R*, Henry Vaux, School of Forestry, University of California; Howard Morgan, Weyerhaeuser Company; Hardy L. Shirley, State University (New York) College of Forestry; Richard E. McArdle, U. S. Forest Service; and Joseph E. McCaffrey (*Chairman*), International Paper Company.

Richard E. McArdle, *left*, and Conrad L. Wirth pose April 11 before a Washington luncheon where they received 1960-1961 Rockefeller Public Service Awards in the conservation and resources field. McArdle is chief of the Forest Service, Department of Agriculture; Wirth is director of the Interior Department's National Park Service.

R. E. McArdle Wins Rockefeller Public Service Award

Richard E. McArdle, chief of the U. S. Forest Service, was one of six winners of the Rockefeller Public Service Awards for distinguished service in the federal government. The awards were given at a luncheon in the Shoreham Hotel, Washington, D. C., on April 11.

Dr. McArdle's award, as was one also given to Conrad L. Wirth, director of the National Park Service, was for outstanding service in the field of conservation and resources to the people of the United States.

The awards have been made possible since 1951 by funds contributed to Princeton University by John D. Rockefeller III. Princeton has entrusted the administration of this project to its Woodrow Wilson School of Public and International Affairs. The awards are based on the conviction that these critical times require the services of America's ablest and most gifted citizens.

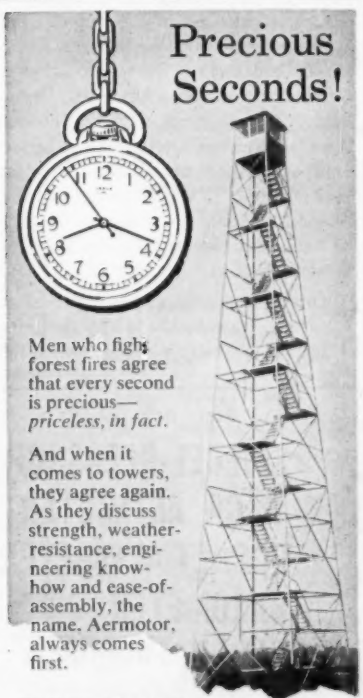
The six winners received a cash honorarium of $3,500. Each winner could draw upon additional funds, however, if he wished to devote some effort to sharing his knowledge and his experience with others. He could do this by writing a book, preparing a series of lectures or articles, or by pursuing a research project at a university where he would also be available for seminars and consultation. It is a winner's privilege to undertake such activities; it is in no sense an obligation or a requirement.

Eligibility rules as set by the Rockefeller Public Service Awards are simple: To win an award, a man or woman must have been in federal government service for at least 15 years and must be at least 45 years of age. This stipulation is made so that the awards will go to career public servants.

The other awards were presented to:

Robert M. Ball, deputy director, Bureau of Old Age and Survivors Insurance, Social Security Administration, Department of Health, Education and Welfare.

Charles E. Bohlen, special assistant to the Secretary of State, Bureau of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International Organization Affairs, Department of State.

Sterling Brown Hendricks, chief scientist, Mineral Nutrition Laboratory for Pioneering Research, Agricultural Research Service, U. S. Department of Agriculture.

Leonard Niederlehner, deputy general counsel, Department of Defense.

Dean Rusk, Secretary of State, called for a strengthening of our federal career service in an address delivered at the luncheon honoring the six winners. Mr. Rusk discussed his concept of public service and the increased need in these critical times for attracting our nation's most able citizens to active participation in the service of the government.

Presiding over the luncheon was Dr. Robert F. Goheen, president of Princeton University.

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With some 200 guests in attendance, including members of the Cabinet, heads of other government agencies and members of Congress, John D. Rockefeller III, who contributed the funds which have made these awards possible, also spoke briefly.

National Watershed Congress Held in Tucson, Arizona

More than 300 delegates attended the 8th National Watershed Congress held in Tucson, Arizona, April 17, 18, and 19. They were from 44 states and one foreign country.

C. R. Gutermuth of the Wildlife Management Institute served as chairman of the Congress steering committee and of the opening session on "Planning for Water Use." The speakers were Senator Robert S. Kerr of Oklahoma; Donald A. Williams, administrator of the Soil Conservation Service; and Dean Frank J. Trelease, of the College of Law, University of Wyoming.

At the first luncheon, with James B. Craig, editor of *American Forests*, presiding, an address of welcome was given by Arthur N. Pack, president of the Charles Lathrop Pack Forestry Foundation. A tour by bus was then taken to the Arizona-Sonora Desert Museum, followed by a chuck wagon dinner at Old Tueson.

The second indoor session featured "Multiple Use of Watersheds." Among the speakers were Commissioner Harold G. Wilm of the New York State Conservation Department; and Frank J. Welch, Assistant Secretary of Agriculture.

A second bus tour was then taken to Mt. Lemmon in the Coronado National Forest, under the guidance of Norman P. Weedon, forest supervisor. The Congress annual dinner followed with awards being presented to Watersheds of the Year (Plain Dealing, La., and Culpepper County, Va.). A fascinating illustrated lecture on how small watershed programs help communities grow was given by L. L. Males of Cheyenne, Okla. A live wild animal demonstration representative of desert fauna by Hal Gras concluded the dinner program.

"Water for a Thirsty Land" was the topic of the final session. Among the speakers were Andrew L. McComb, head of the Department of Watershed Management, University of Arizona; Fred Kennedy, regional forester, U. S. Forest Service Southwestern Region; and Karl S. Landstrom, director of the Bureau of Land Management. The final luncheon speaker was Francis W. Sargent, executive director of the Outdoor Recreation Resources Review Commission.

The Society of American Foresters was represented at the Congress by President Charles A. Connaughton and Henry Clepper, executive secretary. The Society is one of 27 national organizations that sponsor these annual watershed congresses.

The Latin American Forestry Research Committee

The Regional Committee on Forestry Research of the Latin American Forestry Commission held its second session in Caracas, Venezuela, on March 27-29, 1961. Representing the United States at the meeting were V. L. Harper, assistant chief of the Forest Service, and Frank H. Wadsworth, director of the Forest Service's Tropical Forestry Research Center in Puerto Rico. The purpose of this international conference attended by delegates from many of the Latin American countries was to review research progress on regional problems of concern to their countries and to chart the future work of the Committee.

This Committee, with Harper as its chairman, was established by the Latin American Forestry Commission, which

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is under the sponsorship of the Food and Agricultural Organization of the United Nations. The Committee has three operating sections with Wadsworth as leader of the section on tree planting. The two other sections are under the leadership of G. Budowski for forest terminology and Richard N. Jorgensen for utilization of tropical hardwoods. Budowski is acting director of the Department of Natural Resources of the International Institute of Agricultural Sciences at Turrialba, Costa Rica. This Institute is maintained by the Organization of American States, of which, of course, the United States is a member. Jorgensen was with the Latin American Forestry Training and Research Institute at Merida, Venezuela, until his return to his present position as professor in the Forestry School at Pennsylvania State University. The Merida Institute is supported by FAO and a number of Latin American countries.

The working members of the Committee's sections are public and private individuals throughout the Latin American countries who have an interest in forestry problems and who are willing to help on projects. Cooperatively, they have collected considerable data on the growth rate of trees in the more promising forest plantations of the region, made a start in compiling a list of Latin American (Spanish) terms used in forestry, and have begun a regionwide project on finding out what is known and being done about utilization of tropical hardwoods. A planting progress report has already been issued and other section reports are expected to be published later.

The Committee at its Caracas session decided to establish two additional working units—a Research Evaluation Section, whose purpose will be to stimulate Latin American countries to do more research, and a Working Party to explore both the need for and the feasibility of maintaining a professional society of Latin American foresters.

Harper has served as chairman of this Committee since it was established in 1958. Serving in that capacity for the next term will be Roberto Villaseñor of Mexico. Villaseñor is director of the Institute of Forest Research at Mexico City.

New Chief of Finland's Forest Service

Antero Piha, Doctor of Agronomy and Forestry, was appointed general director of the State Board of Forests (Forest Service) by the President of Finland last October. He assumed the duties of this office in December.

Probably in no country in the world does the chief of its Forest Service enjoy more national importance and prestige, if as much, as in Finland. Forests are the very backbone of the economy. Seventy-one percent of Finland's land is forest land. One-third of this is in national forests. Situated in the far north, poor in other natural resources, and not self-sustaining in foodstuffs, foreign trade is of vital importance to Finland. Forest products constitute from 80 to 90 percent of her exports.

Dr. Piha obtained his Bachelor of Forestry degree in 1930, his Master in 1933, and Ph.D. in 1941. He held a variety of positions with the University of Helsinki, a prominent Finnish magazine, the Enso-Gutzeit Company—Finland's largest forest industry company, the Forest Research Institute, and the Ministry of Communications before becoming in 1942 the forestry adviser of the Union of Agricultural Producers, which is also a union of farm forest owners. He held this important post some 18 years prior to his new appointment.

Dr. Piha succeeds another able, distinguished forester, N. A. Osara, very favorably known by many foresters in the United States.

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Lake States Industrial Foresters Hold Seminar

The first Seminar for Industrial Foresters in the Lake States held March 26-29 at the Trees for Tomorrow Camp, Eagle River, Wis., attracted 46 industrial foresters. Instruction was focused on forest entomology and pathology. At the conclusion of the session, action was taken for the sponsor, Lake States Council of Industrial Foresters, to plan another seminar in 1962.

Benton R. Cancell, executive vice president St. Regis Paper Co., New York City, was a keynote speaker. Members of the planning committee were Marlowe Burgy, Owens-Illinois Tomahawk Mill Division; Bruno Berklund, Nekoosa-Edwards Paper Co.; C. A. Samuelson, Kimberly-Clark Corporation; Bruce Buell, Marathon, A Division of American Can Co., committee chairman; and Ward Smith, Rhinelander Paper Co., Division of St. Regis Paper Co.

Personnel from the University of Wisconsin, Wisconsin Conservation Department, Lake States Forest Experiment Station, U. S. Forest Service, and industry were members of the staff.

Cooperative Southern Forestry Field Meeting

A special train was run by the Seaboard Air Line Railroad from Raleigh to Southern Pines, N. C., on March 29 for a forestry field demonstration, where emphasis was placed on forest management and wood utilization, according to an announcement by Seaboard's general forestry agent, Robert N. Hoskins.

Included in the group which boarded the special train in Raleigh were some 75 members of the North Carolina general assembly along with more than 180 business and industrial leaders from Raleigh and such out-of-state points as New York City, Washington, D. C., Atlanta, Ga., and Richmond, Va.

The field program in the Southern Pines area, which brought together forestry leaders from business and industry as well as representatives from the state and federal forest services, was climaxed by an address given by John L. Tower, vice president, International Paper Company, New York City.

The Honorable Terry Sanford, Governor of North Carolina, spoke briefly to the more than nine hundred persons assembled, pointing out that "... in these days when allotments limit production on some of our crops, there is no limitation on the planting of trees. Here is indeed a money crop!"

One of the highlights in the day's program was a demonstration of modern methods of fighting forest fires with aireraft staged by the North Carolina Division of Forestry.

Cooperating with Seaboard on the special train project were the Forestry Division of the North Carolina Department of Conservation and Development, the State Department of Agriculture and the North Carolina State College School of Forestry, Union Bag-Camp Paper Corporation, West Virginia Pulp and Paper Company, International Paper Company, Nitrogen Division of Allied Chemical Corporation, Riegel Carolina Corporation, Halifax Paper Company, and Bowaters Carolina Corporation.

Tree Farm Program Marks 20th Anniversary

On June 12 the voluntary, industry-sponsored American Tree Farm Program becomes 20 years old. The movement was begun in 1941 when Weyerhaeuser Company established the 120,000-acre "Clemons Tree Farm." American Forest Products Industries, Inc., national coordinator of the program, was also established in 1941 as educational and informational

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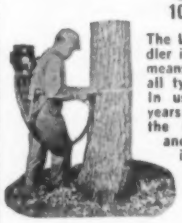
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To date almost 20,000 trees farms, encompassing some 55 million acres, are certified Tree Farms. AFPI defines a Tree Farm as an "area of privately owned taxpaying land dedicated to continuous growth of forest crops for commercial purposes." Local committees composed of both public and privately employed foresters pass upon the eligibility of lands for such certification.

Industrial Forestry Association Notes Progress, Elects Officers

The tree farm area of Western Oregon and Western Washington's Douglas-fir belt has passed the 6 million acre mark with the recent certification of 87,410 acres, according to C. W. Richen, president of the Industrial Forestry Association.

Certified were the South McKenzie Tree Farm of United States Plywood Corp. in Lane County, Ore., the Smith River Tree Farm of Harold and Donna Woolley in Douglas County, Ore., and Kirk's Tahuya Tree Farm of G. R. Kirk Co. in Mason County, Wash. These new tree farms added 33,182 acres.

Also approved were additions to previously certified tree farms of 55,228 acres. The West Coast Tree Farm area now stands at 6,063,895 acres or 45 percent of the region's private forests, Richen said.

The Association held its 27th annual meeting at Portland, Ore., in April with a theme of "More Timber Through IFA." Richen emphasized that the Association was formed in 1934 to improve the industry's forest practices. He said IFA has since increased its forestry efforts to include encouragement of better forestry on public lands because of their importance to the region's economy.

He cited the Association's leadership through founding of the tree farm movement 20 years ago, the 120 million trees for reforestation from its nursery, its scientific genetics research, its urging of sound public forest policies, and work for fair taxation of private timber, as evidence of its efforts for a permanent timber supply.

Richen, Northwest Timber Manager for Crown Zellerbach Corp., Portland, was re-elected president.

Re-elected vice president was Werner Mayr, Hoquiam, Wash., and R. P. Conklin, Cascades Plywood Corp., Portland, was re-elected secretary. Gene D. Knudson, Dallas, Ore., was elected treasurer.

W. D. Hagenstein and N. E. Bjorklund, both of Portland, were re-elected executive vice president and assistant secretary, respectively.

Oregon directors elected were N. B. Giustina and L. J. Bagley, Eugene; N. B. Hult, Junction City; Faye H. Stewart, Culp Creek; P. F. Ehinger, Westfir; E. W. Pease and S. V. McQueen, Medford; Lee Nelson, Coos Bay; T. J. Starker, Corvallis; G. D. Knudson, Dallas; and C. W. Richen, R. P. Conklin, L. E. Orthmann, and J. S. Brandis, Portland.

Washington directors elected were Werner Mayr and L. J. Forrest, Hoquiam; T. R. Sheldon, Everett; E. F. Heacox and R. L. Martin, Tacoma; H. O. Puhn, Shelton; A. J. Sandoz, Longview; and Garrett Eddy and S. G. Merryman, Seattle.

Thirteen of the 23 directors are graduate foresters.

Rocky Mountain Timber Operators Association Meets

The Rocky Mountain Timber Operators Association held its annual meeting in February 1961 at Denver, Colorado. Officers elected were J. S. Whitney, Kaibab Lumber Co., president; Ward Blazzard, Kamas Valley Lumber Co., vice president; Frank R. Crow, secretary-manager.

The Association has retained Sidney S. Jacobs, Denver attorney, as corporation counsel and James F. Haskins, C.P.A., to conduct sales and cost supplies of timber operations in the Region.

The Association was organized in 1960, with the cooperation and assistance of the U. S. Forest Service and the Western Pine Association, by timber operators in Colorado, South Dakota, Wyoming, and Eastern Utah for the purpose of promoting closer cooperation between the operators and the U. S. Forest Service, and to assist its members in solving their common problems.

The principal problem at the moment is the economic squeeze brought about by rising stumpage costs during the current period of depressed lumber markets, and the Association is now gathering data on production costs and selling prices in an attempt to assist the Forest Service in their preparation of stumpage appraisals geared to local conditions.

Membership in the Association is open to any producer of, or dealer in, forest products in Colorado, Wyoming, South Dakota, and the lodgepole pine-Engelmann spruce areas of northeastern Utah and northern New Mexico. Information can be obtained by writing Frank R. Crow, Secretary, 2460 Kendall Street, Edgewater, Colo.

Hudson Pulp & Paper Personnel Items

The Hudson Pulp & Paper Corp., Palatka, Fla., has announced one promotion and the addition of two new members to its technical forestry staff.

Edwin S. Dew of Tallahassee, Fla., and a graduate of the University of Florida School of Forestry, was promoted in January to the position of supervisor of all Hudson woodlands in Florida. He succeeds C. G. McKelvey, deceased.

Named as assistant to the woodlands division manager was William D. Ticknor. He is a Yale forestry graduate, and prior to joining the Hudson organization was assistant to the chief forester of Scott Paper Co. in Win-

slow, Maine.

Albert L. C. Nelson has been named assistant wood procurement manager. Nelson, also a Yale graduate, has for the past 11 years been a forest engineer with the Crossett Co. in Arkansas and the Container Corp. in Ohio.

Public

Minnesota and Wisconsin Extension Foresters Retire

Parker O. Anderson and Fred B. Trenk, extension foresters from Minnesota and Wisconsin, respectively, who are planning to retire in July, were honored at an appropriate ceremony during the North Central Regional Extension Foresters' Conference, Kellogg Biological Station, Hickory Corners, Mich., in February.

Two retiring extension foresters, Parker O. Anderson, Minnesota, and Fred B. Trenk, Wisconsin.

Each "diploma" bore the wording "For Decades of Distinguished and Devoted Effective Extension Effort." Also an appropriate forestry gift was presented to each.

The Extension Service employment of these two men totals 73 years—37 for Trenk and 36 for Anderson. In connection with Anderson's extension work, he is credited with establishing the first 4-H Conservation Camp in America. He also pioneered the sawmill short courses for small sawmill operators. A veteran of World War I with service in France, he served as state chairman of the American Legion Conservation Committee for over 25 years. During World War II he served with the Foreign Economics Service in Ecuador, South America, for one year, and has served as president of both the Minnesota Conservation Federation and the Minnesota Forestry Association. For several years he has been chairman of a statewide committee to select Minnesota's Champion Farmer-Sportsman of the year. For the past dozen years, he has represented The American Forestry Association on the Trail Rider Trips. Anderson was honored at a Minnesota Governor's Banquet held May 6, 1960, by being the recipient of a Senior Forestry Award during the 16th annual "Keep Minnesota Green" celebration.

Fred B. Trenk began his extension

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forestry work in the State of Maryland. He was there for six years before moving to Wsconsin. In 1949 he was awarded U.S.D.A.'s Superior Service Award for outstanding work in Extension Service and for "exceptional ability and ingenuity in conducting educational programs in connection with farm forestry and related land use problems." His accomplishments include the development of a new design in tree planting machines which stepped up tree planting tremendously. He initiated the publication of a Wisconsin Forest Products Marketing Bulletin, and promoted an effective shelterbelt planting program in the sandy areas of his state. His timber harvest demonstration forests serve as a model for other states. Trenk was one of the pioneers in the land zoning in the Lake States, and has sparked the establishment of school forests, the Wisconsin Christmas Tree Producers' Association, and maple syrup institutes.

Both Anderson and Trenk have issued numerous extension publications and authored a number of forestry and allied articles which have appeared in magazines and metropolitan papers.

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USDA Acquires Title to Klamath Indian Lands

Secretary of Agriculture Orville L. Freeman on April 14 signed a proclamation acquiring title to the former Klamath Indian tribal lands which will be the nucleus of the planned Winema National Forest in Oregon.

The Indians who voted to sell their interests in the tribal lands will receive a total of $68,719,000.

Purchase of the 525,000 acres of Indian lands scheduled to take place April 1 was held up by court order because of an injunction filed by some members of the tribe. The order was lifted April 7, thereby permitting plans for establishment of the national forest to go ahead.

Under Acts of Congress 617,000 acres of the reservation were offered for sale to private parties with the provision that land not purchased by April 1, 1961, was to be placed under management of the U. S. Department of Agriculture's Forest Service. Private purchase brought $1,636,182 to the Indians.

In establishing the new forest Secretary Freeman will adjust boundary lines between the reservation and adjoining national forests to obtain more efficient administration of the lands. About 100,000 acres of the reservation will be added to the Fremont National Forest, and about 500,000 acres of three adjoining national forests will be put in the new Winema Forest.

TVA Establishes New Program; Two Foresters Promoted

The Tennessee Valley Authority has announced the establishment of a Tributary Area Development Office which will direct and coordinate the agency's increased emphasis on existing programs for achieving better use of resources in tributary areas of the Tennessee Valley.

Director of the office is Richard Kilbourne, previously head of the TVA forestry program. He assumed his new duties April 17. His office will be located in Knoxville.

The Tributary Area Development program is an outgrowth of activities which date back to experimental watershed projects during TVA's first years. In these early research projects the agency concentrated on studying the effects of various farming and forestry practices on Tennessee Valley soil and water resources and encouraged similar study by state colleges and resource agencies. This work was later broadened to include the unified development of small tributary watersheds in a series of demonstration projects like west Tennessee's Beech

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River watershed and Mississippi's Yellow Creek watershed, with the states playing an active part with TVA. Both the experimental projects and demonstration watersheds will continue under the new program.

Kilbourne, a native of Kansas, has been in TVA forestry work since 1933, except for World War II combat service with the Marines. He holds an A. B. degree from Washburn University in Topeka and an M.F. degree from the Yale School of Forestry.

Before joining TVA, he was with the Tennessee State Forest Service, the Maryland State Department of Forestry, and the Maryland Extension Service. In TVA he became assistant chief forester and chief of the Watershed Protection Division in 1939, assistant director of Forestry Relations in 1940, and director in 1954.

Kenneth J. Seigworth will succeed Kilbourne as director of the Division of Forestry Relations.

Seigworth has worked in TVA forestry since 1937, when he joined the agency as assistant chief of the Watershed Protection Branch. Four years later he was promoted to district forestry supervisor, and the following year to the position of chief of the Forest Development Branch.

Before joining T₹A he worked for the Crossett Lumber Co. in Arkansas, the Maryland Department of Forests and Parks, the University of Maryland, the Agricultural Adjustment Administration, and the Resettlement Administration, all in forestry or allied fields.

TVA's forestry activities are carried on in close cooperation with many federal and state agencies, and with private industry. These activities have been conducted under two broad classifications: forest development, which has been headed by Seigworth, and forestry investigations, under E. G. Wiesehuegel. The Division also includes the Fish and Game Branch, headed by C. J. Chance.

Doyle Promoted to Assistant Director of BLM

James F. Doyle, Bureau of Land Management area administrator, Portland, Ore., has been promoted to an assistant director of the Bureau. He will work primarily on plans and legislation. Doyle has been with the Department of the Interior for the past 23 years. He went to Portland in 1947 as attorney for BLM's O&C Administration; in 1950 he became assistant area administrator for Area I (Oregon, Washington, and California); and in 1954 was promoted to area administrator. He is a graduate of Fordham University and a member

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of the New York Bar. He also holds memberships in the American Society of Range Management and the Society of American Foresters.

Zumwalt Succeeds Horning in BLM Forestry Post

Eugene V. Zumwalt was named forestry staff officer of the Bureau of Land Management, effective May 1. At the time of the appointment he was serving as assistant to the BLM area administrator in Alaska. He succeeds Walter H. Horning who will reach mandatory retirement age in January 1962.

Mr. Zumwalt began his BLM career in 1953 at Anchorage, Alaska. He had previously taught forestry at the University of Washington and at Yale.

Mr. Horning began his federal forestry career in 1935 and has been BLM staff forestry officer for the past 12 years. He has currently been assigned to make a study and evaluation of the Bureau's forestry activities and practices in western Oregon. In announcing the reassignment, BLM Director Carl S. Landstrom stated: "Too often we have permitted an outstanding career adminstrator to retire without documenting the knowledge acquired during his career. I know of no other person who has the wealth of knowledge of the O&C lands possessed by Mr. Horning. His studies and analysis should provide us wth valuable information. . . ."

Deputy Assistant Chief for USFS Protection and Development

George S. James, head of U. S. Forest Service public information programs in the Southern Region since 1958, has been promoted to the Washington, D. C., staff of the Forest Service.

James will become deputy to Assistant Chief A. W. Greeley in charge of the nationwide programs of National Forest Protection and Development which include fire control, engineering, and land adjustments and classification.

James, who went to the Southern Region of the Forest Service from the California Regional Office in San Francisco, has been a career employee since 1933.

Most recently, he served as assistant regional forester in charge of public information and education for California National Forests; supervisor of the Klamath National Forest, Yreka; fire control officer and forest engineer of Modoc National Forest at Alturas; and district forest ranger on Sequoia National Forest, Bakersfield.

He also has served in fire control planning positions throughout the California National Forests and in the Rocky Mountain Region of the Forest Service with headquarters in Denver, Colo.

A native of Nevada, he is a graduate of the University of California at Berkeley.

Ralph Hill Promoted to Washington Post

Ralph Hill, chief of the Branch of Wildlife Management in the Denver Regional Office of the U. S. Forest Service since 1958, on April 1 began a new assignment as assistant director of the Division of Wildlife Management in the Washington Office.

Hill received his forestry degree in 1925 from the Connecticut Agricultural College and his Master in 1927 from Yale. From 1927 to 1945, Hill served successively on the Pike and Roosevelt Forests, Colorado, the Black Hills in South Dakota, and the Nebraska National Forest, advancing through assignments as junior forester, assistant forest supervisor, and supervisor. In 1945 he transferred from the Nebraska Forest to the Division of Range Management in the Denver Regional Office where he has been promoted through assignments as range examiner and biologist to the position as chief of the Branch of Wildlife Management which he entered in 1958.

Staff Named for New National Forest

Administrative personnel to manage a new national forest in southern Oregon have been named by J. Herbert Stone, Pacific Northwest regional forester, U. S. Forest Service.

The action followed acceptance by the federal government of 525,000 acres of former Klamath Indian Reservation lands. The lands will be administered as a separate national forest and will be the nucleus of a larger Winema National Forest.

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Alexander E. Smith of Portland will be supervisor of the new forest, Stone said. In recent weeks Smith has represented the regional forester in pretransfer planning. Smith has been working out of Klamath Falls, which will be headquarters for administration of the new national forest.

The present Winema Forest will consist of former Indian Reservation lands. Boundary adjustments including portions of the Rogue River, Fremont, and Deschutes National Forests will be accomplished at a later date to establish a forest of approximately 913,000 acres.

The new supervisor most recently was assistant chief of the Division of Information and Education in the Regional Office at Portland. He is a graduate of the University of Washington.

Members of Smith's staff will be Charles B. Waldron, in charge of range, wildlife, and watershed management; Dan B. Abraham, fire control, recreation, and lands; Norman E. Gould, timber management; Kjell M. Bakke engineering; and William A. North, administrative officer.

Robert E. Crittenden will be administrative assistant. Homer G. Faulkner will be ranger on the Chiloquin District, and Douglas B. Shaw will be ranger on the Chemult District.

Roosevelt National Forest Supervisor Named

David M. Gaufin, for the past four years assistant to the chief of the Division of Wildlife Management in the Washington office of the U. S. Forest Service, has been recently named supervisor of the Roosevelt National Forest, Colorado. Prior to his Washington assignment, Gaufin has served as staff assistant and ranger on several forests in Region Four and with the Utah State Game and Fish Department. He is a 1938 forestry graduate of the Utah State Agricultural College.

As forest supervisor, he succeeds James L. Wenban who has been named to head the Division of Personnel Management in the Northern Region of the Forest Service.

Outdoor Recreation in National Forests Greatest in History

More people went to the national forests for recreation in 1960 than ever before, with visits totaling 92½ million, Secretary of Agriculture Orville L. Freeman has reported.

The figure represents an increase of 13.5 percent over 1959 recreation use.

Mr. Freeman noted that the U. S. Forest Service built 3,000 new family camp and picnic units under its Operation Outdoors Program last year to meet the rising demands, but use of picnic and camp grounds continued to exceed available facilities. He indicated that additional sites are needed and will be developed under a broad program to develop facilities which encourage balanced use of forestry resources.

Reports from Forest Service field offices show that the visits for fishing, hunting, hiking, and riding increased more than those for other types of recreation. Skiing also increased this past year as several new winter sports sites began full operation.

Other recreation visits showed a normal increase of 10 to 15 percent. Among these are wilderness travel and what the Forest Service calls "general enjoyment of the forest environment." In this latter class are people who stop to view the scenery, or for relaxation, or wander briefly along a trail or stream. Motorists driving through the forests are not included in the recreation count.

Purpose of recreation visits, in order of popularity, was general enjoyment, picnicking, fishing, hunting, and camping.

72,288,000 Visit National Parks

The National Park Service has announced that 72,288,000 people visited the 29 national parks and 147 other areas adminstered by the National Park Service in 1960. While there are 186 areas in the system, there are nine small areas where no count is taken. In addition, the total count does not include those areas of the National Capital Parks in Washington, D. C., and environs. During 1960 the system for counting visitors was changed to give more accurate tabulation. Had the counting system not been changed, the count for 1960 would have been 65,587,000, an increase of 4.8 percent over the record high of 1959. The Great Smoky Mountains National Park was the most popular with 4,528,600 visitors.

C. W. Mattison Appointed to Consultant Post

New York Conservation Commissioner Harold G. Wilm has announced the appointment of Charles W. Mattison of Middle Grove as full-time con-

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sultant for the Department's $75 million land-aequisition program.

Mr. Mattison will handle administrative details connected with the inspection, surveying, appraisal, and purchase of land for parks, campsites, boat-launching sites, and other recreational purposes under the Bond issue program.

Mr. Mattison studied forestry at Cornell University where he was graduated in 1928. He served as county forester in Watertown, N. Y. (1930-1932) and in 1933 joined the staff of the U. S. Forest Service. Until 1942, Mr. Mattison was assigned to work with the Civilian Conservation Corps in New York, New Jersey, and Pennsylvania. He subsequently worked in Virginia, and in 1945 was transferred to the Washington office of the Forest Service where he directed its school and college program as chief of the Branch of Education until his retirement in July, 1960.

Wenban to Head Missoula Personnel Division

James L. Wenban has been named to succeed Clayton S. Crocker as chief of the Division of Personnel Management, according to announcement from the office of the regional forester, U. S. Forest Service, in Missoula, Mont.

Mr. Crocker retired March 31 after 40 years of service.

Wenban has been supervisor of the Roosevelt National Forest in Colorado since 1958. He has worked on the Klamath National Forest in California, on the Medicine Bow National Forest in Wyoming, and on the Pike National Forest in Colorado.

He served as head of the Section of Operations of the Division of Administrative Management in Juneau, Alaska, from 1953 until 1956. From then until he became supervisor of the Roosevelt National Forest, he was assistant chief of the Division of Operation for Personnel Management.

A native of Washington, Wenban is a graduate of New York State College of Forestry and has done postgraduate work at American University in Washington, D. C.

He was a silviculturist with the War Department in 1940 and 1941, and served in the U. S. Navy from 1942 to 1946.

Payne and Hixon Promotions Announced

Promotion and transfer of Burnett H. Payne to the position of deputy assistant chief of the U. S. Forest Service in Washington, D. C., was announced in April by Regional Forester Chas. A. Connaughton. Payne will be succeeded as chief of the Division of Timber Management for the California Region by Homer J. Hixon. Hixon has served as assistant division director of timber management in the Washington Office of the Forest Service for the past two years. The changes were effective April 16.

Payne has headed up timber management activities in California since 1952. He graduated from the University of Washington in 1932 and filled progressively responsible positions in the Pacific Northwest, Washington, D. C., and the California Region.

Hixon graduated from University of Washington School of Forestry in 1934.

Schools

Fourth Annual Conclave of Southern Forestry Schools

The Fourth Annual Conclave of the Southern Association of Forestry Schools was held at Camp Blanding, near Starke, Fla., April 7-9.

Approximately 250 students of the 10 southern forestry schools were in attendance. The University of Florida School of Forestry was host to the conclave. Contests were held in timber estimation, pole classification, chain throwing, knife throwing, axe throwing, pole climbing, Sons-of-Paul Bunyan (Beard) contest, bow sawing, cross-cut sawing, log rolling, log chopping, pole felling, and log birling. The contests started at 8:00 a.m. and ended at 6:30 p.m. The events were scored into first, second, and third places. Georgia finished first, Auburn second, and Arkansas third-place winner in total points. Other teams in order of standing were Clemson, Oklahoma, Louisiana State, North Carolina State, and Stephen F. Austin State College.

The annual banquet was held at the Enlisted Men's Club at Camp Blanding, on the shores of Kingsley Lake. Thomas A. Morse, of the University of Florida, president of the association, gave the welcoming address. Dr. C. M. Kaufman, director of the School of Forestry, acted as master of ceremonies. Sandra Jo Bryant, University of Florida junior and Queen of the Conclave, assisted Prof. Don Post in awarding a certificate to each winner. In addition, each first place winner received 10 silver dollars, second—$7.50, and third place—$5. The host school, University of Florida, did not participate in the contests.

Missouri Announces Doctorate Program

A program leading to a doctor degree in forestry has been approved by the Graduate School of the University of Missouri.

This announcement was made by R. H. Westveld, director of the University's School of Forestry.

For the immediate future, doctor degrees will be offered in the fields of forest economics, forest soils, forest ecology, forest genetics, and tree physiology.

Dr. Westveld said the new program is being made possible by the excellent laboratory facilities available to the School of Forestry since it moved into the new Agriculture Building.

The school has been offering an undergraduate program in forestry since 1946 and a graduate program leading to a master degree since 1950.

Faculty Changes at Paul Smith's College

Dr. C. Buxton, president of Paul Smith's College, Paul Smiths, N. Y.,

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has announced the appointment of William Rutherford, Jr., to the newly created position of dean of faculty and registrar. Rutherford has served as head of the Forestry Department since 1950 and will continue in that capacity temporarily.

Rutherford graduated with an A.B. degree from Central College in Missouri in 1938. In 1940 he received the B.S.F. and M.F. degrees from the University of Michigan. Following graduation Rutherford was employed by the Soil Conservation Service in Georgia. After service in World War II, he was employed by the Northeastern Forest Experiment Station, resigning in 1950 to become head of the Forestry Department of Paul Smith's College.

President Buxton has also added Kenneth Norton and John R. Curry to the forestry faculty.

Kenneth Norton graduated from the New York College of Forestry at Syra-

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

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Forester, B.S. Forestry British Columbia, M.F. Yale, age 36, married, 3 children. Experience: Practical agriculture, coconut plantation manager; forest survey, logging road location, management planning in Canada; currently logging superintendent in Central America. Fluent Spanish and four other languages. Desire position in expanding organization offering responsibility and future advancement. Will consider world-wide location.
Box R, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.S. 1957, New York State College of Forestry. Age 27, single. Naval officer four years. Presently instructor of naval leadership at the Officer Candidate School. Service obligation ends September 1961. Forestry experience: foreman of tree removal crew, survey party crew chief and research assistant for the State University of N.Y. Desire position in forestry or related field in the northeast.
Box S, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.S. 1950: Eleven years experience in Forest Management—State and private. Work included public relations, fire protection, management plans, administration, timberland appraisal, supervision of machine planting and photo planimetric mapping. Desire management position with chance for advancement and responsibility, possibly combined with public relations and/or forest recreation. Will consider offers from public or private organizations.
Box T, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.S.F., M.C.M. & T., 15 years experience including forestry, timber management, wood procurement, forest engineering, reforestation, comprehensive knowledge of sawmilling and pulp and paper mill operations. Qualified for administrative responsibilities in above fields. Registered Forester in State of Michigan. Presently located in Lake States, desire relocating in Northern California or Northwest.
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Box V, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

B.S. in forestry, University of Missouri, 1959. Age 27, married, veteran. Experience: U.S.F.S. summers Montana, Oregon, New Mexico; One year Arizona: general administration, soils management, all phases of timber sales. Six months photogrammetry with large aerial survey company. Desire forest management position with private industry in South, Colorado, or Pacific Northwest. Will consider all locations.
Box W, Society of American Foresters, 425 Mills Building, Washington, D. C.

B.S. in Forestry, Louisiana State 1959. Married and military service completed. Desire position in forest management, preferably in South, offering opportunity for advancement. Experience in management and loan appraisals. Presently a practicing forester and pulpwood contractor. Backed by good practical recommendations.
Box X, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

cuse with a B.S. degree in wood utilization in 1942. Prior to entering the Army he purchased wood for the aircraft industries. Following service in World War II, Norton returned to Saranac Lake where he established a nursery and Christmas tree growing enterprise. For the past year he has served as executive secretary of the New York Christmas Tree Growers' Association of which he was one of the founders in 1953.

John R. Curry graduated in forestry from Cornell University in 1924 and acquired a degree of M.S.F. from the University of California at Berkeley in 1953. For five years after graduation he was in charge of forest protection for the State Department of Forests and Parks in Maryland. In 1930 he went to the California Forest Experiment Station as a member of the forest fire research group. He later was placed in charge of this work and continued it until 1939 when he transferred to the Southern Forest Experiment Station as head of the Division of Forest Management. He returned to his native home in the Adirondacks in 1947 to establish the Adirondack Branch of the Northeastern Forest Experiment Station. Curry resigned from the Forest Service in 1953 to become general manager of Whitney Industries at Sabattis, N. Y.

Allied

FPRS to Meet in Kentucky

The Forest Products Research Society's 15th annual meeting will be held in Louisville, Ky., June 18-23.

Carl Trinkle, FPRS general committee chairman, announced that "Product Development—Keystone to Expanded Markets" will be the keynote of the meeting which will begin on Sunday, June 18. Technical sessions will begin Monday morning, June 19.

Soil Conservation Society to Meet at Purdue

Purdue University will be the site of the 16th annual meeting of the Soil Conservation Society of America. "Land Use in a Changing Agriculture" is the theme of the meeting which will open on July 30 and conclude on August 2.

Walter C. Gumbel of West Virginia, president of the Society, anticipates a registration of over 1,500 professional conservationists. All persons having an interest in conservation are welcome at all Society meetings.

Mississippi Governor Appoints Advisory Committee on Forestry

Governor Ross R. Barnett of Mississippi has appointed an advisory committee on forestry to aid in coordinating the forestry programs of state agencies, plan educational programs, study technical forestry problems, draft necessary legislation, and look into problems hindering development of the state's forest economy.

The 24-man committee plans to work closely with the state's Agricultural and Industrial Board, Game & Fish Commission, Forestry Commission, Forestry Bank, and other agencies. Periodically, the committee will meet with and report to the Governor.

Governor Barnett selected 11 members of the committee from among the officers, executive committee, board, and staff of the Mississippi Forestry Association. The MFA represents some 1,900 wood-using industries, banks, timberland owners, and other individuals and companies.

The committee has chosen as its chairman John W. Squires of Jackson, forester for Sears Roebuck and Company, and a past president of MFA. Elected secretary was Ben A. Davis, Jr., of Jackson, executive vice president of MFA.

Mississippi, which leads the entire nation in the number of certified Tree Farms, has some 17,000,000 acres of timberland. Wood-using plants of the state employ about one-third of all industrial workers.

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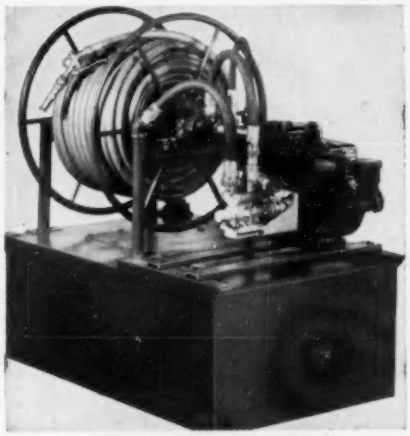

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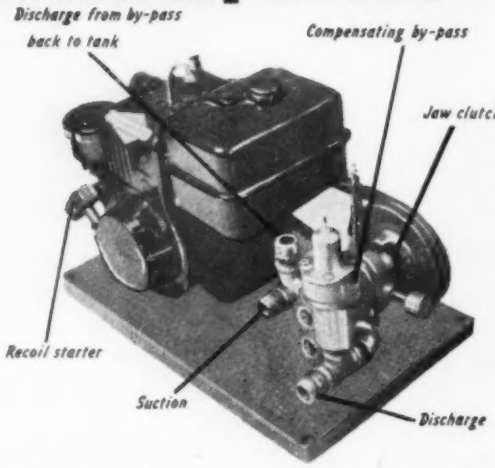

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